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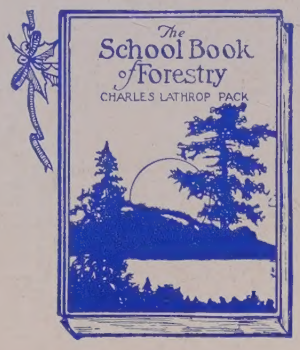

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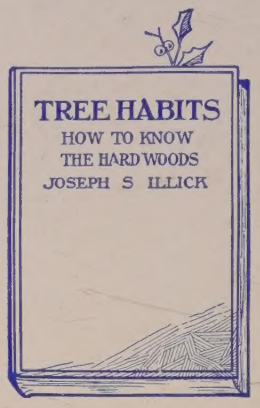

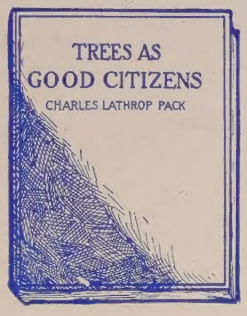

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TOMORROW AND THE TREE-PLANTING ARMY

Thousands Are Thinking of 1972 and Celebrating Arbor Day's Centennial in 1926

THE TREE-PLANTING ARMY is at work again. Either by individuals or by organizations they are proving they do not come within the scope of the cartoon by J. N. Darling, the cartoonist, himself a member of the tree-planting army. The centennial of Arbor Day comes in 1972, but the thing to do is celebrate the centennial by planting your trees right now. Do not let your grandchildren say what "Ding" pictures. If you want tree-planting information and a registration blank for yourself, your school or your organization, send a stamp to the American Tree Association at Washington, D. C., and ask for them.

* * *

Perhaps you can organize a tree-planting campaign in your county. Forty-five thousand seedlings were planted this year on Ohio farms and in municipal parks by twenty-six chapters of the Isaac Walton League. This work was done in accord with a plan outlined by Edmund Secrest, state forester. Each chapter is asked to cooperate with farmers by planting at least one acre a year. The state furnishes the trees, the league members do the planting, the farmer agreeing to protect his young trees. The new Philadelphia Chapter planted three and one-half acres at Schoenbrunn Park, the site of the first white settlement in Ohio. The Springfield Chapter planted fourteen acres of the new municipal forest which is sponsored by that chapter.

* * *

Do you want to interest the coming generation in tree planting? Does the coming generation know outdoor good manners and the value of the woodlands? Boys and girls in Iowa are learning answers to some of these problems through forestry schools in their camps. From two schools held in the summer of 1923 to twenty-five schools held during the past summer is the record of growth made. This year 1,400 boys and girls and 100 adult leaders took the work.

These schools are conducted by the Forestry Extension Service in cooperation with the Farm Bureau, boy Scouts, Y. M. C. A., 4-H Clubs and other similar organizations. Not a small part of the work is being done in 4-H Club girls' camps.

The work consists of four lessons, I. T. Bode reports to the American Tree Association. The lessons are field studies and hikes. Lesson one covers identification of common trees of the locality, usually in the vicinity of camp. Lesson two deals with use of some of the species both in the woods and out, and with caring for one's self when using the woods for recreation or other purposes. Lesson three continues from lesson two and takes up, in addition, the building of camp fires and the need for care with fires in the woods. Lesson four covers forest influences, such as wild life dependent upon the woods for its existence, the effect of forests upon stream flow and ground water, the economic importance of forests to the nation, and other phases.

* * *

The Camp Fire Girls are making this "Tree Year in Camp Fire." They expect there will be many Camp Fire friendly highways started and many a Camp Fire forest under way, Barbara Ellen Joy informs the American Tree Association. The Grand Rapids Camp Fire Girls planted 10,000 trees last spring. It seems evident this organization is not going to be subject to any of Ding's cartoons.

* * *

They are after the coming generation in New York State, too. The interest of three boys in reforestation and the generosity of three fish and game clubs in Orange County that are helping to make reforestation a statewide project sent Earl Hock, Milton Bookstaver and Charles DuBois on the four-day reforestation tour conducted by the Conservation Commission and Cornell University throughout the Adirondacks and northeastern New York. C. C. Davis, Farm Bureau Agent, is a firm believer in the reforesting movement as the best method of making profitable use of idle land, and G. D. Musser, the County Club Agent in charge of junior extension work, has been active in interesting boys in this work. As a mark of appreciation and encouragement the Middletown, Port Jervis and Walden Fish and Game Clubs donated twenty-five dollars each for prizes for the boys doing the best work, and when the boys were asked whether they would prefer to receive the money themselves to put in the bank or spend, or to have it used to pay their expenses on the four-day forestry tour where they could study, at first hand, reforestation from the planting of seeds in the nursery to the development of large forest plantations, they chose the latter.

* * *

Alexander Macdonald, Conservation Commissioner, has planted a memorial forest of ten thousand trees in the Forest Preserve as New York State's contribution in honoring Gene Stratton Porter. A similar forest was planted in the spring of 1925 in memory of Clara Barton, founder and first president of the American Red Cross Society, in the Adirondack Forest Preserve.

* * *

In Michigan, Muskegon County has taken up reforestation as one of its major county projects. In 1925 our plantings of spruce and pine were in excess of 150,000 trees. This year our planting exceeds 200,000 and may reach a quarter of a million trees, Carl H. Knopf, County Agricultural Agent, reports. Pupils in the fifth grade of the schools, at the direction of Margaret A. Kelly, have joined the tree-planting army.

PROVIDING FOR THE FUTURE

MAKE A GOOD ONE. I WANT MY DESCENDANTS TO REMEMBER ADOLPHUS BUTTERFINGER AS A GREAT MAN!
CUT MY NAME DEEP SO IT WON'T WEAR OFF. I WANT MY GREAT GREAT GRAND CHILDREN TO HOLD ME IN LOVING REMEMBRANCE!
ADOLPHUS BUTTERFINGER 1875 — 19
ABSOLUTELY!
GENTLEMEN HAVE WE THOUGHT OF EVERYTHING TO IMPRESS MY PROGENY WITH MY BENEVOLENCE AND WISDOM?
LAST WILL AND TESTAMENT OF ADOLPHUS BUTTERFINGER
CHILDREN I WANT TO TELL YOU ABOUT YOUR GREAT-GREAT GRANDFATHER!
OF ALL THE BLOOMING NUTS THAT EVER LIVED YOUR GRANDFATHER ADOLPHUS AND HIS WHOLE GENERATION WERE THE MOST WORMY! THINK OF DENUDING THE FORESTS AND DOING NOTHING TO REFOREST THE WASTE LANDS
DENUDED AMERICAN FORESTS
FUTURE GENERATIONS

J. N. DARLING IN N. Y. HERALD-TRIBUNE

Christmas Joy--with your own LIVING Tree!

IT TAKES years for a tree to grow even a few feet high. Yet millions of young evergreen trees are slaughtered each Christmas season! The very finest trees, selected, and cut down! This flourishing, fragrant forest that it has taken Nature ten to twenty years to create, suddenly swept away by the axe! A week later these millions of trees are thrown out as brown dead sticks of wood on rubbish heaps!

Must this be the price of Christmas?

No! Such a way to celebrate the Day of Life and Love is TOTALLY UNNECESSARY.

The answer is obvious to every person who admires the glory of a growing tree. *Use a living tree instead of a dead one.* Plant a tree instead of cutting one down. Let the one you use keep its roots that are its life system.

This will add immeasurably to the value of your Christmas tree. It will be fresher and its needles will not drop off. It will add a unique touch of interest to your Christmas to point to your tree and say—"It is alive!"

"Oh, Woodman, spare that tree! Touch not a single bough."

An Expert's Endorsement

[Note: Lester C. Lovett is a horticulturist of national fame. Recently President of the Eastern Nurseryman's Association, he is one of the most highly respected experts in the country on this subject.]

"This is to certify that I have examined carefully the Norway Spruce trees which you propose sending out just prior to Christmas as living Christmas trees, and can conscientiously declare them to be as fine a lot of healthy, vigorous Evergreen trees as I have ever seen. They are splendidly rooted, thrifty specimens, having been transplanted comparatively recently, and, as just stated, are certainly an exceedingly fine lot of Nursery Stock—in fact, I do not believe it would be possible to obtain better trees anywhere at any price.

"L. C. LOVETT."

The Guild Tree is a real tested spruce sent to you at slight cost

THE Living Tree Guild stands for *not less* use of Christmas trees, *but more* use. We want you to have a Christmas tree that will be more beautiful and more valuable, but without destroying one. We invite you to discover how easy it is and how much pleasure there is in bringing up a real tree.

Look for the Name

When you see the name *Guild Tree* on the container you will know that it is one of the special trees of The Living Tree Guild.

These "A" *Guild Trees* (there is a smaller size called "C" *Guild Trees* that people are using for living Christmas cards) are six-year-old Norway Spruces. They have been transplanted in the nursery a number of times in such a way as to develop the finest root systems. They are 18 to 24 inches high, plus the height of the container which makes them stand about thirty inches. This is the best and most useful size for a table tree, also at this age they are most easily handled, and have the finest chance of healthy survival. *The Guild Tree* is becoming famous. It is the nearest scientific approach to such a high standard of tree culture. It is offered at a price that puts this finest of Norway Spruce within the reach of everyone.

If you have a place to plant it outdoors after Christmas it will grow, and each year you will have a larger tree to bring in at Christmas time—without costing a cent more you have a permanent growing investment. And you have added to the sum total of trees that make this country a beautiful place to live in.

Shipping

Unless a special date is requested your tree will be shipped between December 10th and 20th. The average express charge for these crated trees is only 40c to 65c. If you want all charges prepaid add 50c per tree to your remittance.

Guaranteed to Live

Trees, like other living things, have various personalities and constitutions. However, if you take an interest in your Guild Tree and follow instructions, the Living Tree Guild will replace it without cost in the spring in case it fails to survive. *The Guild Tree* is the only one in existence that is offered in this way, so far as we know. If we will back you up in this manner won't you back up this idea by using a Living Christmas tree?

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Each tree will be carefully planted in an attractive red lacquer metal pot. There will be no handling necessary for you. Simply remove the wrapping—and there it is ready to use.

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Please reserve for me a Guild Spruce Tree per your offer. If remittance is not enclosed herewith you may send C. O. D.

Name.....

Address.....

(☐) Check here if you want 2 trees for $7.50.

AMERICAN NATURE ASSOCIATION ACTIVITIES

OWING TO an extension of the field of the American Nature Association's Finley-Church Expedition to the treeless islands of the Bering Sea and Alaska, commencement of the story of the expedition may be delayed until the January issue of NATURE MAGAZINE. Word from Mr. Finley indicates that the new fields were well worth the trip, and if it is editorially possible the story will begin in December. At the time of going to press this month, however, it is impossible to plan exactly.

* * *

With a view to tendering assistance and advice along the lines of Nature Study work, our Director of Nature Education, Professor E. Laurence Palmer, is making a trip to the west coast. Among the meetings he will attend and address are: The East Tennessee Teachers' Association at Knoxville, October 28 to 30; The Iowa State Teachers' Association at Des Moines, November 5 and 6; The Southern California State Teachers' Association at Fresno, November 22 and 23. Between November 16 and December 17, Professor Palmer will work with the teachers in Berkeley, San Francisco and San José, delivering various Nature Study lectures as well. This work is a part of the campaign of the American Nature Association to assist development of Nature Study work in the schools and to assist teachers in this comparatively new field.

* * *

Members of the American Nature Association living in communities in a position to establish community forests as additions to the local timber supply, recreation areas and wild life refuges, will find valuable information in "Town Forests" published by the American Tree Association. Copies of this booklet will be sent on request.

* * *

May we call attention to the attractive illustrations of Mr. Terhune's article in this issue. As an artist who portrays dogs with all their appeal, Miss Marguerite Kirmse needs no introduction. Miss Kirmse is an enthusiastic member of the American Nature Association.

* * *

Formation of local Nature Clubs is actively urged by the American Nature Association, which stands ready to be of any service possible to such groups. In this connection we are glad to publish a request from Joseph B. Ullman of 1 Walworth Avenue, White Plains, New York, that we put him in touch with Nature Clubs in high schools. Such a club has been formed at White Plains and would like to correspond with other similar groups. The American Nature Association, also, would like to hear of the work of such clubs.

* * *

A fine and full Nature program has been planned out for the winter by the Natural History Museum at Balboa Park, San Diego, California. Any of our members visiting in the vicinity are invited to join in the Nature walks and excursions, full details of which can be obtained from this excellent and progressive museum.

* * *

Write to us about your local Nature Club work.

OUR RIVERS — BY J. N. DARLING

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Prizes for Cartoons

One of the important educational activities of the American Nature Association is its campaign for the protection and beautification of our roadsides. Above is a cartoon by J. N. Darling, better known as "Ding," expressing graphically the story of the despoliation and pollution of our rivers and streams. It illustrates the effectiveness of the cartoon in telling a story.

As a part of its campaign the American Nature Association offers three prizes of $100, $50 and $25 for the three cartoons best expressing the need of roadside beautification and directed against the various desecrations of Nature's beauties. In addition, a year's membership in the Association will be awarded for every cartoon accepted in the contest and printed in NATURE MAGAZINE.

This contest is open to all who wield a story-telling pen or pencil. The judges will include three nationally known cartoonists on a board to be announced later. There is no restriction on the number of cartoons an individual may submit. None will be returned unless accompanied by return postage.

The contest closes April 1, and announcement of the awards will be made in the May issue of NATURE MAGAZINE.

Cartoons should be sent to:

CARTOONS, NATURE MAGAZINE
1214 Sixteenth Street N.W., Washington, D. C.

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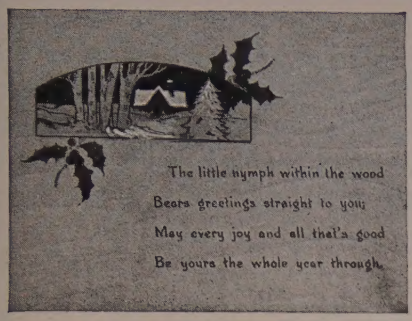
The little nymph within the wood
Bears greetings straight to you;
May every joy and all that's good
Be yours the whole year through.

The Ideal Card for Tree Lovers

Four actual thin slices of wood, admirably adapted to this use. Their durability, smoothness and delicate beauty of wood-structure are a revelation. Illustrated circular on request.

Prices: 20c each; $2.25 per doz.; $4.25 per 25; $8 per 50; $15 per 100. Send $1.00 for sample set of five designs.

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Extension Department

AMERICAN NATURE ASSOCIATION

15 Boudinot St. Princeton, N.J.

Questions and Answers

The American Nature Association will be glad to answer each month such questions as its members ask about Nature.

QUESTION: *What insect is called the death watch?*—C. E.

ANSWER: The death watch is usually a beetle of the genus *Anobium*, which bores holes in wood. The sound is made by the insect bobbing its head, and thus tapping the wood.

QUESTION: *What causes the glow of a firefly?*—H. L. K.

ANSWER: The light from fireflies comes from a plate, covered only by a very thin skin, which secretes a substance that undergoes rapid combustion because of the rich supply of oxygen supplied by the tracheal tubes. It is an almost perfect light, there being practically no heat rays generated. In the electric light, only about 10 per cent are light rays.

QUESTION: *What is the proper way to pick up rabbits?*—L. R. M.

ANSWER: Rabbits should not be picked up by the ears, as this is painful and cruel. The best way is to grasp them by the loose skin just back of the shoulder blades. If the animal is large and heavy, it should be further supported by holding the other hand beneath its rump.

QUESTION: *Do animals have two sets of teeth?*—C. E.

ANSWER: Practically all mammals have a first set of teeth called milk teeth, as does man. These are later shed, being pushed out by the permanent teeth, which sprout from the jaws beneath the first ones.

QUESTION: *Please give me some information about the American alligator or crocodile. Are they one and the same?*—L. R. B.

ANSWER: Two crocodilians inhabit the United States, the American alligator (*Alligator mississippiensis*), which frequents the fresh waters of our southern coast region from the Carolinas to the Rio Grande, and the American crocodile, found in the United States only in southern Florida. These lay twenty-five or thirty eggs, which are hatched by the warmth of their surroundings. The young grow faster than is generally stated, growing about eighteen inches the first year and a foot or so a year for a few years following. The alligator is much persecuted and is becoming rare; the crocodile has always been so.

QUESTION: *Which is the largest frog in the world?*—C. E.

ANSWER: The largest frog is the Goliath frog, of the Cameroons, Africa.

The stuff that men are made of

There's plenty of time to grow old. But adventure, romance and corking good entertainment call right now from the pages of THE AMERICAN BOY. Boys will play football with Ralph Henry Barbour's likable heroes; they will laugh their heads off at Ellis Parker Butler's delightful characters. Thomson Burtis, James Willard Schultz, and many other notable writers will round out the twelve wonderful issues with gripping tales of romance and adventure. Such well-known artists as Tony Sarg, Charles Livingston Bull, F. C. Yohn and Ernest Fuhr will illustrate these stories.

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Nature Calendar

NOVEMBER

Clad in sober new suits, our bobolinks are in the rice fields of South Carolina and Georgia.

The Arctic tern has regained the Antarctic regions with its young, after having flown something like 11,000 miles to nest in the Arctic.

The bluebird will be leaving the latitude of northern Ohio the early part of this month. When he returns in February may he find many nice nesting boxes awaiting him, for he wages a losing battle with English sparrows and starlings.

The witch hazel is now putting forth its yellow fringy flowers. Except for stray dandelions, they are the last for many a day in northern states.

That vigorous and enterprising flycatcher, the kingbird, left us in September and is by now, doubtless, in the dictator business somewhere in Central America or perhaps in Bolivia.

Many loons, grebes, ducks, geese and kingfishers are still in the latitude of New York, and will remain until compelled to seek open water.

Holly berries are safe for Christmas use, as most birds do not like them, and they consume mountain ash berries only under compulsion.

The "Seven Sleepers" are already, or soon will be, curled up in their winter quarters—skunk, woodchuck, chipmunk, bat, jumping mouse, raccoon, and black bear.

The members of the deer family are very much awake, and among moose, elk, and caribou tremendous battles are still going on between rivals for a mate.

By the first of the month, the frosts will have stilled the persistent voices of most of those lesser minstrels of the night, the crickets and katydids, but before that time have been laid the eggs which will produce next year's choristers.

THE MOUNTAIN ANGELS

"He who has loved the mountain angels
Is always lonely-hearted;
He will hear them rustle, rustle,
Their wings against the pane;
He will hear them singing, singing,
Far, far upon Sun Mountain,
While he is hid in cities,
Brooding in the rain."

—Vachel Lindsay.

It is pleasant to think of the frost grapes and the fruit of the cedar, the sassafras and the cucumber tree, on which the birds are feeding.

Eels are beginning to descend from inland waters to the ocean. There their eggs will be laid, and they will never return to fresh water.

With the disappearance of the Pleiades in November, the ancients believed that navigation should close. The "rainy Hyades," which "vext the dim sea" in Homer's and in Tennyson's verse, have also disappeared from the skies at night.

Unlike the eels, the salmon have been laying their eggs in the rivers, and there they will die without seeing the ocean again.

The chipmunk has carried sometimes four acorns of the white oak in each of his cheek pouches (Seton), and has stored everything away shipshape, so that he will never have to get out and poke around under the snow for buried and forgotten nuts, as do his cousins, the squirrels.

Brer Fox also is perfectly wide-awake and up and doing, ready to give any hound a run for his money. His husky bark may be heard all winter on still nights.

Though the day of most of our flowers is past, some of the most pleasing of the blossoming gems await the time of frosts to display their beauty. Gentians may often be found after the early snows have come.

November 3 is the 132nd anniversary of the birth of William Cullen Bryant. The day should not pass unnoticed by Nature lovers.

"In him dumb Nature found a skillful tongue
For all the thoughts wherewith her breast is rife. . . .
But yet of all the songs this minstrel sung
The noblest was the poem of his life."

—William Herbert Carruth.

Prepared for Nature Magazine by the Cleveland Museum of Natural History.

THE MONGREL IS A GRAND DOG

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NATURE MAGAZINE

Vol. VIII NOVEMBER, 1926 No. 5

You are his pal. That is enough for him, and come luck or misfortune, good repute or bad, honor or shame, he is going to stick to you, give his life for you, if need be—foolish, brainless, soulless dog!—JEROME K. JEROME.

THE MONGREL—JUST DOG

By ALBERT PAYSON TERHUNE

(ILLUSTRATED BY MARGUERITE KIRMSE)

NO, THIS article is not intended in any way as a joke. There is nothing funny about the mongrel, except that not one dog-owner in ten has the sense to appreciate him. He is the foremost citizen of dogdom, in numbers and in cleverness and in stamina. No series about dogs would be complete without him. For he is the most important dog of the lot.

Do you realize that more than 76 per cent of the dogs in America are mongrels? Well, they are. "Crossbreed" is a better and more descriptive word. To write of only 24 per cent of any genus and to ignore the remaining 76 per cent would be as foolishly unjust as to mention only the leisure class or the professional folk of a country and to leave the rest of the populace unspoken of.

How many humans are purebred? How many can trace their genealogy unbroken for ten generations, with no admixture of foreign blood? Look back a few generations and you will find the average American is a blend of half a dozen nationalities, sometimes with a tinge of Indian or other dark-skinned ancestry. Why demand in our dogs a purity of pedigree which many of their masters do not possess?

The mongrel, or crossbred dog is as likely to be a good chum and guard as is his blue-blooded brother of the show-bench. He has a score of advantages over that brother. For example, he is infinitely stronger. Every year, thousands of thoroughbred dogs die from distemper. Fully half of them die when that most dreaded of all canine diseases attacks them. In some distemper epidemics the mortality is 80 per cent.

Who ever heard of a mongrel dying from distemper? Rarely does the disease find toe-hold in his rugged system. When it does, he is likely to go around, glum and miserable, for a day or two, and then blossom out with new spirits and appetite, as well as ever. It is so when any other malady afflicts him. He is the healthiest dog on earth. Often he is the most beautiful, thanks to his blend of breeds.

You have watched the so-called "animal acts" in vaudeville. (Personally, I get up and go out when such acts begin, for, though some of the dogs may be trained to their tricks by kindness, hundreds of them have been starved or tortured into proficiency in the pretty stunts which rouse your applause.) Well, in nearly all of those "animal acts" you will have noticed that the dogs are mongrels. Very few are pedigreed thoroughbreds. I will tell you why.

DON'T BE ASHAMED OF OWNING A MONGREL

Be ashamed of your own neglect if you haven't brought out all that is finest and wisest in him.

HE WAS BOOSTED OVER THE TRENCH TOP

Carrying a message to headquarters, he was wounded three times but won through to his goal—and death.

In the first place, of course, mongrels are cheaper. That is an item to be considered, if several are to die of hardship before one of them can be perfected for the stage. But the chief reason is that mongrels are far quicker to learn the most complicated tricks than are even the most brilliant thoroughbreds. They take to stunts naturally, and they are willing to work themselves to death, if need be, to please their trainers.

While all the stage tricks on earth do not seem to me to be worth the look of panic-stricken agony in the wistful eyes of one tortured dog, yet such vaudeville acts are more or less popular. Many people do not realize what often is the history of these acts.

We are prone to value and to develop anything, in direct ratio to its cost to us. The mongrel suffers by that human trait. For instance, if we spend several hundred dollars on a blue-blooded dog, we feel we ought to bring out all the best in him to justify our expenditure and to get some of the worth of our money. So we train him and "humanize" him and lavish upon him much care and education. When the result justifies the cash and the labor, we are vastly proud.

But when we pay from fifty cents to two dollars for a mongrel dog, to guard the house and for the children to play with, we have no such extravagance to make good on. Because he cost little or nothing, we are likely to assume that he is worth little or nothing. And we waste scant time or brain in developing his latent possibilities.

If a thoroughbred were neglected thus, he would amount to nothing. Often, in spite of lack of training, a mongrel turns out to be an ideal chum and guard and picks up more clever accomplishments than would a purebred. In such cases, we are apt to say patronizingly of him:

"Of course, he's only a mutt. But he's got quite a lot of sense—for a mongrel."

Spend one-half the care and the time and the intelligence in training your "mutt" that you would spend on a $500 bench-winner, and your outlay will bring in an unbelievable profit. You will find your mongrel gaily eager to learn and to pick up your ways and those of your household. In short, you can develop him into the best chum-dog or trick dog or house dog in all the canine category. Give him a chance. That is all he asks, and he has a right to it.

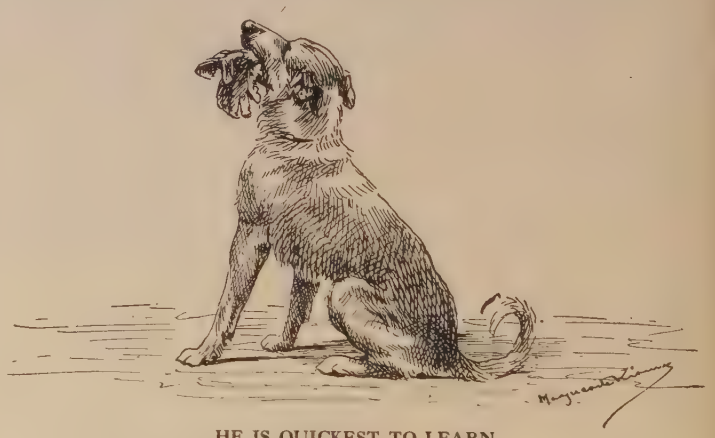
A friend of mine in the A. E. F. told me of an American regiment that was cut off from support and from communication with the main body in 1918. Surrender or destruction was to be its fate unless help could arrive. But there was no regular means at hand for summoning that help.

As a last resort, a message was fastened to the collar of a nondescript mongrel that had been trained for such work at the canine war-school in England. He was boosted over the trench top and sent on his way to the division headquarters, far distant. It was a forlorn hope, at best. Nobody counted much on it.

The moment the stubby-tailed and fleasome "yaller dawg" appeared in the open, the Germans knew on what mission he had been sent. Sharpshooters opened a blaze of fire on the elusively running little cur as he scuttled up the hill in full view of them. Then, as an added bit of true sportsmanship, three German machine guns cut loose at him.

Twice, before he reached the shelter of the hill's farther side, he fell and rolled over as bullets found their mark in him. But always he struggled gamely to his feet and scrambled on. At the hilltop he fell a third time and lay there. As the watchers gave him up for a goner, he writhed to his feet, dragging his hindlegs behind him, crippled, and vanished over the crest.

In time—but only barely in time—he crawled into headquarters. There, as the message was untied from his rope collar, he gave a tired little sigh and died. His work was done. His regiment was saved. At last he had time for the luxury of dying. Up till then he had been too busy.



HE IS QUICKEST TO LEARN

We are wont to waste scant time or brain in developing the mongrel's possibilities.

Nor was he by any means the only mongrel to give up his white life, that men might live, during the days of the war. The British War Office archives contain many another instance of the sort. The English have learned to appreciate the brain and loyalty and dauntless stamina of mongrels as we Americans have not. That is why so many crossbreeds were used by them as war-dogs.

Don't be ashamed of owing a mongrel. He is a grand dog. Be ashamed of your own neglect if you haven't brought out all that is finest and that is wisest in him.

This is another article by Mr. Howes on the discoveries at the Jungle Biological Station in Dominica.

Several new and entertaining stories and pictures by the author are in prospect for the coming year.

REMINDER OF AN ANCIENT AGE

This house gecko was one of the strange lizards in Mr. Howes' zoo, reminding one of a monster of the Reptilian age.

OUR DOMINICAN ZOO

PAUL GRISWOLD HOWES

(PHOTOGRAPHS BY THE AUTHOR)

WITHIN a week or two, after settling down to concentrated work at our station in the Dominican mountains, a small zoological garden automatically forced itself upon our hands, for each new trip into the wild surrounding forests and gorges yielded its quota of strange creatures to be brought back to the station alive for the purpose of study at close range. Some of these were tiny, some large and powerful. Some were angry and fighting mad about it, while still others made no protest whatever at being captured and brought to the zoo to be inspected and to have their portraits made. This strange crowd, inhabiting rough cages and boxes, included insects, frogs, lizards, snakes, birds, mammals and a few fishes and crab. While I may speak only briefly of their personalities, I hope that these portraits and notes will give some idea of the great interest attached to these isolated creatures of Dominica.

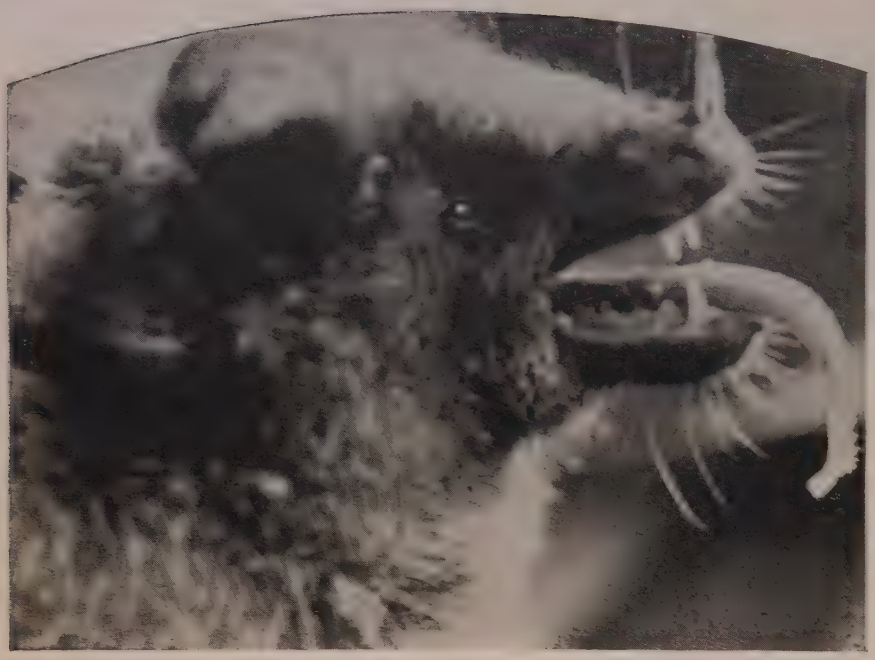
Streams and rivers abound in the forests and mountains of this island, and in them lie mysteries. I found in one a tiny fish, the spotted goby, *Sicydium punctatum* Perugia. It was decorated with flecks of dark pigment over a ground that changed from brown to olive or gray, according to the color of the pebbles on the floor of its habitat. Wherever one may find this fishlet, its stream will be one of two kinds. Either it will be a main river from the higher mountains, that roars and plunges among huge boulders, or a smaller one that carries the rains to the sea from certain sections of the hills. These last streams may be roaring torrents today and entirely dry a week later, when the water has been carried off the hills that they serve.

A TINY DOMINICAN FROG

This small denizen of the forest is dwarfed even by a thr'pence. Enlarged about four times.

Where do these fish go when their streams dry up? Surely not to the junction of river and sea as the drying advances, for the fishes appear again in the churning waters as soon as a fresh downpour fills the pools among the boulders. I have not solved the mystery to my satisfaction, but I have made observations that seem significant. In all my experience I have never seen a species that could stand so much shock or successfully survive more unfavorable conditions.

In the station zoo was an exhibit consisting of a glass box, measuring six by six by two inches. In the bottom lay pebbles taken from a stream nearby, and a jar was filled with water. This was the home of one of these fishes. During two months in the box absolutely no water plants were used, and no fresh water was added, yet the fish was as healthy as



A LEAF-NOSED DOMINICAN NIGHT PROWLER

Note the interesting barbed tongue. It always pays to examine the inside of things as well as the outside.

upon the day of its capture and the water as clear as crystal! Here, it would seem, was another mystery, but the solution was really quite easy. Our fish cared nothing if there be no oxygen in the water, but simply rose to the surface from time to time, and there, with its nose and eyes out of the water, remained contentedly enough until it had secured a supply of the desired element.

To aid it in this operation, the goby is fitted with a remarkable suction disk. This appendage upon its belly works exactly like the rubber darts that we have all shot from toy guns, and which adhere to whatever substance they are fired at. This device is used to cling to perpendicular surfaces like the sides of the aquarium, and in its natural environment the fish uses it in clinging to the rocks where the current is too violent for it to remain unaided.

From what I have seen, I believe that this strange fish burrows among the rocks and pebbles of the stream-bed as the water becomes lower and finally disappears. It will stand the roughest of handling and it is certainly able to take oxygen from the atmosphere. The fish probably lies in the damp understrata of its chosen habitat until the rains bring the next flow of water gurgling about it, when out it comes with its fellow fishes, to feed and swim again.

One of the strangest creatures in the zoo was the big house gecko. He was a big lizard that seemed to have dropped from remote ages into the present day. He brought to one's mind pictures of prehistoric monsters that roamed the earth in the age of reptiles. Gecko lived up in the roof, or between the walls, and came prowling about after dark in search of insect food. His eyes were like those of a cat with slits for pupils that were capable of expanding into much larger and rounder objects as night approached.

Near the base of a gecko's tail, there is a swollen area, followed by a constriction. At this point the tail is loosely joined to the rest of the lizard and the owner is able to snap it off if captured. This is a very interesting fact and undoubtedly aids the gecko to escape in many cases. After the tail is snapped off, it wriggles with such violence as to attract the attention of the lizard's enemy, while the real living body escapes.

The feet of a gecko are fitted with a remarkable set of overlapping, half disks. These are on the under sides of the toes in two rows of twenty-three to twenty-five, and are used in clinging to ceilings and perpendicular walls. The feet are also partly webbed, but the geckos never appear to go into water or live near to a stream.

Our zoo contained several remarkable snakes. I believe that our black and white "king snakes" were the tamest, most friendly and docile creatures. They were not common in Dominica, but one might run across as many as five or six in a month of searching. They inhabited the edges of clearings and trails where they could easily procure food in the open and yet be within easy reach of heavy cover, for the "Mal fini," a small hawk, was ever on the watch for reptiles.

One could pick up a king snake with absolute safety at any time. They would not attempt to bite any more than a frog will. When handled frequently they no longer gave off the characteristic and disagreeable musky odor and in a few days became so tame that one noticed their pleasure at being in human company. In captivity the king snake will readily deposit its long white eggs. They are much dented and vary greatly in shape, but will hatch regardless of this, if properly placed in soil and not allowed to become too dry or too moist.

A ROYAL REPTILE OF DOMINICA

Enlarged view showing the odd and beautiful black and white markings of the king snake, a docile fellow.

The presence of the Antillean boa-constrictor gave an added zest to the searcher for wild animals in Dominica.

They were there in considerable numbers but were cautious and wary, and one had to travel slowly in the right sort of places to find them at home. It was exciting to know that the clearings near the station might support a half dozen of these big, vicious-looking reptiles, and that on any sunny morning one might be seen gliding into the forest as one skirted the fallen trees and old logs at the clearing's edge.

We secured two fine specimens for the zoo, but both of them were small ones. Even these were vicious and struck violently at us as we passed their cage. They coiled about the arms of one who held them captive, and their constricting powers were decidedly noticeable. These boas were not highly colored, the body being of a dull brownish-yellow, varying considerably in shade, and marked with large patches and smaller bands of dark brown to black. In the sunlight, however, these snakes were beautifully iridescent at certain places, which made them remarkable to look at.

The zoo contained few mammals, for they are scarce on Dominica, as is the case with most islands. The dominant form of mammal life is the bat order. All of these strange creatures were remarkably interesting, and their weird faces, bodies and tails, and specialized appendages for catching scents and sounds made a fascinating field for study in themselves.

A rare leaf-nosed bat, *Monophyllus luciae,* was obtained for the zoo. This odd, tailed species was gray in color and had a flesh, leaf-shaped appendage upon its nose. More remarkable still was a heavy tongue of great length, fitted with a series of barbs at its tip which were turned back toward the mammal's mouth. The bat had long whiskers and was altogether a grotesque object. I suspected this bat of being a fruit eater, but unfortunately I was unable to make certain, as only this one specimen was seen.

CERTAINLY A DEAD-LOOKING ANIMAL

But don't be deceived, it is merely the Dominican manicou demonstrating how to "play 'possum."

An animal that gave us much amusement is the Dominican manicou or 'possum. There is perhaps no other object which so tickles the palate of the black native as this odoriferous bit of flesh, and the smile that spreads over the broad features of a lucky hunter upon capturing one is something not easily forgotten.

NOT SO DEAD, AFTER ALL

This Dominican 'possum seems to be saying, "Now that's the time I fooled you. I wasn't dead at all."

A dog helped us in the capture of our first specimen, and at first Mr. 'Possum looked much the worse for his experience. We believed that the dog had partly crushed its body, and for a time the little animal looked as though it might die. It came back to life soon enough, however, and we commenced our campaign for portraits. I had heard many times of the habit of "playing 'possum," and, although I had caught many of them elsewhere, I must confess that I had never seen this trick attempted, until this particular individual came my way.

I had taken one or two pictures of a very active subject, when, finding it impossible to get away, the little beast suddenly collapsed, partly opened its mouth, as though gasping for breath, and then sank into a position that resembled death as closely as if I had killed it and thrown its carcass upon the ground.

Here it remained absolutely motionless for a few minutes, but we were wise to his little game. I took a picture of the death pose and had just about finished when up jumped Mr. 'Possum and wildly scrambled to get away.

We caught him again, of course, but he nearly worked his trick upon us, and now at last I am able to say that I have seen something besides an insect "play 'possum"! I cannot see how this much talked of trick aids the animal to survive, or imagine how or why it originated. Man has come into the 'possum's life too recently to have caused the trick to develop, and, besides all this, the little trickster never seems to think of beginning by acting dead, when the trick might be of some use to it. So it is all a guessing matter.

ELEANOR WOULD BE INTRIGUED AT FIRST

She and Bobby would contest for the privilege of giving the fish four square meals a day—a fatal number.

PHOTOGRAPH BY H. ARMSTRONG ROBERTS

Some Advice on the Home Aquarium

By Frances Brinckle Zerbee

Dear Phyllis:

In your last letter you happened to say that even if you were living in a sixth floor apartment and could not have a dog or cat, you were at least going to have a globe full of goldfish so that the children could have pets of some sort.

If you have not already bought one, don't do it! I can rapidly outline for you just what would happen if you did. You would bring home a small globe containing four large fish and a castle. Bobby and Eleanor would be immensely intrigued at first, would fight with one another for the privilege of changing the water and would be zealous about feeding the fish, seeing that they got three and sometimes four square meals a day. About the third day Goldie would be found dead and Blackie would be floating on his side gasping painfully. Later he would disappear and be found months afterwards under the piano.

By this time both children would be bored with the care of their pets and might even whine a little when asked if they had "seen to the fish." In the end, it would fall to your lot to take care of the one remaining fish which might live for some time in solitary grandeur, but at last you would put the globe on a high shelf in a closet and forget about it until next year when the ten-cent stores were selling fish, and then you would be tempted to try it once more.

Globes will always be popular, I suppose, on account of their pretty shape, but according to expert aquarists this very shape is all wrong and responsible for actual suffering among fish. Madame de Pompadour is supposed to have taken a fiendish delight in watching the tortures of fish in globes.

Please don't think I am accusing you of anything like that, for I know you have only the praiseworthy motive of trying to amuse the children and maybe to interest them in Nature. Perhaps you are not very much thrilled by goldfish yourself, but they go well with the orange and black curtains and your red-lacquer stuff, and you cannot understand why your attempt at keeping them should fail so miserably when it had seemed so simple.

It really is simple if you follow a few sensible rules which I am going to tell you at the risk of sounding "instructive." You don't have to read them if you don't want to.

You just have to realize that you cannot keep any kind of fish contented and healthy unless you imitate, as well as you can, the way he lives in his natural state. He needs oxygen to breathe, room to turn around in, subdued light, the right food, and not too much of it. A small globeful of water, no matter how often changed, fills practically none of these requirements.

The oxygen in a globe, or in any kind of tank, is quickly used up unless you have some means of keeping it replenished. Luckily Nature has a grand arrangement whereby water-plants give out oxygen for the fish to breathe provided the plants can have some of the carbon dioxide breathed out by the fish. Without this they cannot grow, and when you hear people speak of a "balanced aquarium" it merely means that it must contain, among other things, enough plants to please the fish and enough fish to please the plants. When you see goldfish coming to the surface of the water and gasping it means that the oxygen is used up and that more plants are needed to manufacture it. You are more likely to need additional plants to make your balance right than more fish, although your plants will not grow well with no fish or other animal life at all.

THE AQUARIUM ADORNS THE HOME

Two hours' sunlight a day are enough for the plants and too much sunlight is cruel and fatal to the fish.

Water-plants are absolutely necessary if you want a successful aquarium, and the base of a globe is too small to accommodate their roots nicely in the sand that is needed for their nourishment. The large-sized globes are better than the small ones and hold more plants, but to be happy a goldfish should have a

whole gallon of water to himself. When you think what he has been used to in his pond this does not seem very much to give him.

SUNFISH AND ANACHARIS

Two or three snails help to keep the aquarium clean.

Fish are accustomed to a greenish light coming from above only, so you may imagine that a globe, placed in a window and attracting the rays of the sun like a burning glass, which it actually is, pretty nearly blinds the poor things. This is one of the chief objections to the globe, another being the small opening at the top which lessens the amount of water exposed to the air.

In their natural habitat fish often have a struggle finding enough to eat, but this is much better for them than to have six times too much food dumped in upon them by a well-meaning child—or adult. They cram down all they can, of course, but there is always some left in the water to decay and poison them, to say nothing of smelling to heaven. Goldfish are hardy and it takes a good deal to kill them, but this overfeeding, day after day, gets them in time. When you change the water every day you are bound to lower or raise the temperature suddenly, and this is another cause of fish fatalities.

If you will give up the globe idea and start in properly, I can guarantee that you will have an aquarium that will be ornamental, entertaining, nonsmelly and easy to keep that way. A real aquarium, equipped with plants and animal life, does not need to have the water changed at all, providing, of course, that you have made no bad mistakes in the first place that have to be rectified.

The kind of tank that is best to get is the rectangular glass kind with metal bindings. It is more expensive than a globe, but at least you will not have the expense of replacing dead fish all the time. You should have one that will hold eight or ten gallons, for you will probably not be content with less than eight fish, and the safe rule, as I have said, is a gallon of water to a fish. By this I mean small fish, about an inch long. If you want large ones, you will have to remember that the larger the fish the more oxygen he needs and that you will have to cut down the number of inmates to suit the capacity of your tank. I consider small fish better anyway, as large ones look out of proportion and blunder about, uprooting plants and stirring things up generally.

When you have found the tank you want, be sure that it is all ready to receive the fish before you buy or collect any. Clean it out thoroughly and, if you use soap, be sure that it is washed off, as fish do not like soap. Then look around for a place to set it up. It should be on a firm table or support of some kind and near a window so that the plants will have plenty of light to help them grow, and some sunshine; about two hours of sun a day is plenty. This will not be too bright for the fish because the plants help to subdue the light, and, besides, you are to have a rockery where they may hide when they please.

Next you will need some sand, enough to fill your tank to the depth of two inches. Wash this thoroughly by running water over it and stirring it with your hand until the water runs off clear. Then spread it over the bottom of the aquarium, saving out a little to cover roots of plants later on. Next arrange four or five stones of different sizes and shapes in one corner, remembering that your object is to make a little cavern or rockery that will appeal to the fish. Be sure that they are firmly placed so that they will not topple over, and try to leave openings so that the fish can swim in and out.

Now come your plants. You can collect them yourself if you have a car in which to drive to likely places to find them. In the winter you may have to visit the open water of a spring or cut through the ice. Slow-moving streams, old canals, ponds and bogs are the places to look. Even ditches may yield a few kinds. If you wish to buy them instead, stores that sell goldfish generally have some kinds for sale.

Some water-plants are better oxygenators than others, but practically all kinds will do some good, providing you can

CATFISH AND LUDWIGIA

The fish, in dwarf variety, are entertaining fellows with luxuriant whiskers.

BULLFROG TADPOLE AND BLADDERWORT

The tadpole will also help to keep things clean and is at least a year in the tadpole stage.

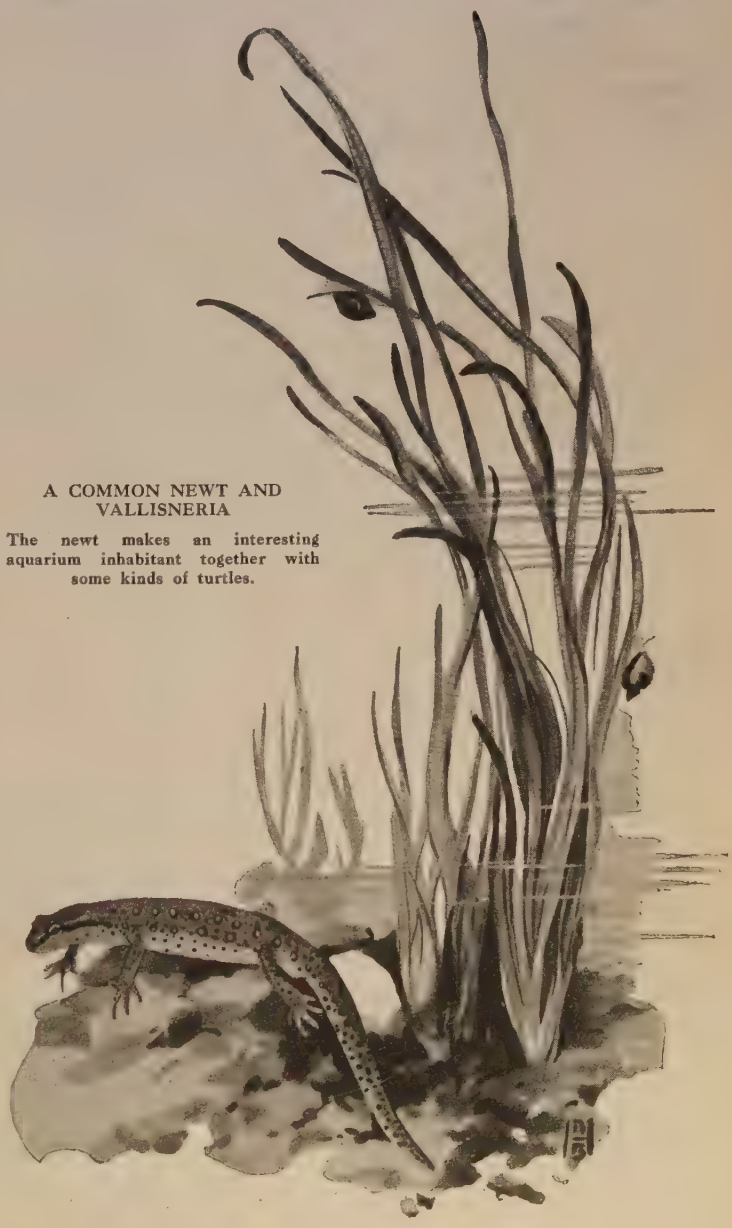
make them grow. There are three particularly good kinds. These are *Vallisneria spiralis,* also called eel grass or channel grass; *Anacharis,* or water thyme, with delicate transparent bright green leaves and rapid growth; and the *Ludwigia,* also known as swamp loose-strife and which grows in marshy places by the roadside. Cuttings from *Anacharis* soon root themselves, and when the shoots grow too long and you want to thin them out uproot them and pinch off as much of the ends as you want, replant them in the sand, and they will soon root again. The cultivated variety of *Ludwigia* is prettier than the wild, the leaves being larger and red on their under sides. There are dozens of kinds of good aquarium plants, but the best results are obtained with the varieties that grow entirely submerged.

It is best to plant them thickly at the back and sides of your tank, leaving the center and front more or less clear so that you may have an uninterrupted view of the fish. Be sure that the roots are spread out well and covered with sand up to where the green leaves begin to grow. As all water-plants shrivel quickly when exposed to air, it is a good plan to have a sprinkling can on hand and to keep them damp while planting. You can use pebbles to weigh down the roots where needed, and when everything is arranged to suit you it is time to fill the tank. Water from the faucet may be all right unless it has been treated too heavily with chemicals. Of course, rain or pond water is better. Fill the tank with the sprinkling can. It is a good idea to put in two or three thicknesses of paper, pouring the water in on that to make the flow more gradual and to avoid uprooting plants. When first filled the tank may have a slightly milky look, due mostly to the air bubbles in the water, but just let it stand for a day or so and the water will be as clear as crystal and the plants will have righted themselves and have begun to look established. And then you are ready for the fish!

Personally I think goldfish are the very stupidest kind, but if you want them for their lovely color it will be easy for you to stock your aquarium since so many places have them for sale. I would not try any of the expensive fancy varieties at first. Pick out small ones, and be sure they are healthy. They should be plump, with no scales missing, and be sure there are no whitish spots or red streaks on their fins and tails. These are sure symptoms of disease, and most fish diseases are contagious. In choosing a fish, look at the fin along his back. If this is perky and erect he is probably in good condition, providing you do not find any of the other symptoms I mentioned. But if this fin is drooping it would be better to choose another fish.

You will need some snails in order to eat up decaying vegetable matter, leftover food and refuse, and to keep the glass free from that green slime you have probably noticed and which is really a microscopic plant doing no harm but looking unsightly. You can generally buy snails where they have goldfish, and you will need about three for your collection. Ask for Japanese and Red Ramshorn snails. You can find the common pond snails yourself, and in my opinion they do about as well as the others, though they are much smaller.

Now your tank is ready to go, and I cannot see why you should have further trouble, providing your plants grow well and you are careful about feeding. There are several kinds of fish foods on the market, and I should get a box of each kind so as to give the fish a little variety. If your snails do not keep the glass clean enough to suit you, an excellent way to do it yourself without disturbing anything



A COMMON NEWT AND VALLISNERIA

The newt makes an interesting aquarium inhabitant together with some kinds of turtles.

is to take a razor blade and scrape the glass with it. This quickly removes the green slime. Once in a while if you think a little mild housecleaning would help, get a piece of half-inch rubber tubing and siphon off the water at the bottom of the tank where dead leaves and particles of food may have lodged. You can strain the same water and put it back or add some that is fresh and of the same temperature. Remember, though, that you should attempt no changing of the water or moving of plants and rocks unless it is absolutely necessary. A balanced aquarium should need nothing drastic done to it for years, provided you give it a little attention now and then as I have suggested.

If you have not set your heart on goldfish, there are many other kinds suitable for small aquaria. I have three dwarf catfish which I caught last summer—the kind they call "Mad Toms" and sell for bait. They are quaint looking with luxuriant whiskers and their eyes set wide apart. Besides, they are graceful and easily tamed. Their appetites are as large as their mouths, and whenever I come near their tank they begin to circulate madly, hoping to be fed. They will eat ordinary fish food but prefer tiny shreds of raw beef.

In the same tank are two small sunfish, the smartest fish in the world for getting the choice tidbits at feeding time. They are a pretty round shape and in some lights are beautifully iridescent, but are apt to be mean to fish smaller than they. Some minnows I had in with them disappeared mysteriously one by one, and I had no idea who the murderers were until I found a sunfish resting sluggishly in the cave with half a minnow sticking out of his mouth!

Snails do not go well with catfish and sunfish because, even if they are not devoured, they are made uneasy by the fish nosing them and knocking them over. They cannot work well when teased, so I should suggest tadpoles for scavengers if you decide upon the combination of fish just mentioned. Be sure to choose big bull-frog tadpoles as the sunfish would make short work of the tiny ones. Besides this, bull-frog tadpoles live as tadpoles for over a year. The books say that fresh-water mussels make good scavengers. I have one that plows conscientiously through the sand in my tank, but he upsets the plants and the rocks, and I consider that he does more harm than good and only keep him for sentiment, since I have had him so long.

If your husband has a minnow-net of the type used to collect bait for bass fishing, make him go along with you and the children. If you operate the net together on a brook or pond, you will be more likely to catch a variety of fish to choose from and they will not be so apt to be injured in the catching. A small hand-net, which is the other alternative, should be as shallow as possible and not cone-shaped like a butterfly net, as the fish become tangled in the net if it goes down to a point and their scales may be injured. Always, if it is necessary to handle a fish at all, see that your hand is wet, as a bad fungus disease is apt to result when the protective slime on the fish is rubbed off.

In the brooks, you can find the little striped dace, easily tamed and hardy, the beautiful red-fin dace, chub mullets, minnows of various sorts, and sand darters, funny little fish with no air bladders which move along the bottom in a series of quick jerks after their food. In the ponds may be found sunfish, many kinds of tadpoles, olive green newts with yellow bellies spotted with black, and in the springtime tiny baby turtles. Do not try to keep crayfish with your fish, as they tear their fins.

Newts and some kinds of turtles make a good combination, as they both like shallow water with the rockwork arranged so that they can crawl out on dry land when they feel like it. It is cruel to force them to stay in the water all the time. I feed mine every day with tiny pieces of lean raw meat on the end of a straw. An earthworm is hailed with enthusiasm. The turtles will eat prepared turtle food, but put in very little. Newts and turtles have enormous appetites and can stand more feeding than fish. Pet shops often have several kinds for sale. Newts of the Japanese variety look like little black dogs with bright orange stomachs. They soon grow very tame, coming to the surface of the water when you draw near and looking up at you yearningly for food, for all the world like begging dogs.

There are still millions of things I'd like to talk about, though I hope I have put down the most important ones. Of course, there are books on aquarium-keeping that will answer all your questions. Do let me know if you take my advice. I know you will not be sorry if you do, and I hope that next time we meet you will be a regular fish fan.

Affectionately, DAPHNE.

A Forest Tragedy

WHAT story does this picture tell to you? To A. H. Mickel, of Carlisle, New York, it tells a tale of a night tragedy in the forest. It is a picture of the snow, white and deep over field and woodland. An unsuspecting partridge is abroad in search of food or perhaps was nestled down in the snow. An owl flew silently, watching also for food. A swoop, a short struggle, and all that remains are feathers. There is trace, also of sly old Renard, likewise foraging about.

A winter tramp over the fields and woodlands after a light fall of snow, writes Mr. Mickel, leaves many such stories for him who understands to read of the ways of our wild friends and of their struggles. Try such a tramp if possible and see whether you can reconstruct the scene of the night before as it is written in the telltale tracks of Nature's creatures. Perhaps they will tell a story of a romantic meeting, of high and dauntless courage, of deadly battle. It is, in truth, the mysterious goings and comings of the wild folk at night that are the most fascinating to him who can read the records that are left, and one with such knowledge is happy in its possession.

NONE MORE HANDSOME, MISCHIEVOUS OR INTERESTING

Though regarded by the farmer as a rascal, to the bird lover he is a bird that never fails to excite pleasure.

THE RIO GRANDE GREEN JAY

By Kate Peel Anderson

(PHOTOGRAPHS BY THE AUTHOR)

MEXICO has contributed a number of striking species of birds to the Lower Rio Grande Valley of Texas, but none more handsome, more mischievous, or more provocative of interest than this large green, yellow, blue and black member of the Crow-Jay family. Although he is ruthlessly slaughtered by the irate farmer whose hens' nests he has despoiled, he is still quite abundant. The bird lover, however, never fails to exclaim with pleasure at the sight of this winged beauty.

He is nearly a foot in length and truly as handsome a fellow as one meets in a day's walk. His upper parts are a lovely blue-green; the crown of the head and hind-neck, a deep, rich blue. The forehead is almost white and the chin, throat, chest and eye region, black. The shoulders, rump and upper tail are yellowish-green, the four middle tail feathers being a darker, brighter green, while the outer ones are yellow. The abdomen is of the same shade of yellow as the outer tail feathers. Unlike the greater number of birds, the male does not have a monopoly on beauty, his mate having exactly the same coloring as does he.

He is an inveterate robber of the nests of wild birds as well as those of domestic fowls, and one is tempted to suspect that this may account for the fact that he seeks the densest, most impenetrable thickets for his own breeding place. The nest, made of thorny twigs, rather scantily lined with grass, rootlets, and rubbish, is most carefully concealed and is very difficult to find. At any time from early April to the middle of May, from three to seven eggs are laid. These have the ground color in a variety of shades of white or buff but frequently of a greenish tinge, the large end thickly spotted with brown and lavender.

Although a denizen of the deep woods, he is a frequent and none too welcome visitor to farming districts. This is especially true if he happens to be traveling within hearing distance of the cackle of a hen. At the farm on which the illustrations for this article were procured, the housewife told me that alert and keenly watchful as she might be whenever an egg was announced, the Green Jay beat her, nine times out of ten, to the nest and had broken the egg before she could reach it.

Even though the jays watched the entire process from near-by trees while the photographer was concealed in a blind just four feet away, a decoy at the edge of the woods brought a half dozen of the birds to the nest before the camera could be adjusted.

The method of one of these birds in emptying an egg-shell is interesting. If there seemed to be time enough and not too many clamoring for a chance at the feast, the bill, after a few hard pecks had made an opening, would be inserted and the contents stirred up, quite vigorously, much as a cook beats an egg. When this was completed the semi-liquid would be drawn up, the head thrown back, and the mass allowed to gurgle down the throat. If, however, the bird was hard pressed, this operation was neglected, and as much of the entire mass as he could gobble was seized at once. Sometimes one more determined than the other would seize the broken egg in his beak and fly away.

Raw meat has even a greater attraction for them than hen's eggs. A piece of steak nailed to the box almost caused a riot. Finally one bird, evidently the king of the community, succeeded in convincing the crowd that they were to wait until he had been properly served. Then their turns would come. This they patiently did but with remarkably hungry and ludicrously wistful expressions.

ALL "PUFFED UP" ABOUT THE INTRUSION

The call of the Green Jay is no more flute-like than others of this somewhat notorious family. It always sounds raucous and quarrelsome, and if he has gentler notes for wooing or other purposes, I have never heard them. But where beauty is writ so large, what more can one fairly demand? If his disposition is not of the sweetest, his habits the most admirable, his voice the most melodious, certainly the beauty of the bird atones for other shortcomings.

ARE BIRD SONGS MUSICAL?

NATURE MAGAZINE OFFERS PRIZE FOR BEST ANSWER TO ATTACK UPON THE MUSIC OF BIRDS

ACCORDING to Mr. George Jean Nathan, New York dramatic and music critic, the idea that there is music in the songs of birds "has been born solely out of the sentimentality of love-smitten and befuddled numskulls." This statement is contained in a brief note by Mr. Nathan in the September issue of *The American Mercury*, of which he is one of the editors. The note is published in a box herewith.

We do not, of course, agree with Mr. Nathan. It is possible that the scope of his study of bird songs (and he must have given the matter serious study in order to be able to issue such a dogmatic statement) has been limited to the canyons of New York City, where the intrepid English sparrow constitutes practically the entire ornithological range. In that event the critic might find it invaluable to spend a week-end afield with I. Ons Swift and his Yosian Brotherhood.

Mr. Nathan, however, has made the statement, whatever his basis may be in point of experience. We are confident that many readers of NATURE MAGAZINE will disagree with him. In order to give them opportunity to express this disagreement, NATURE MAGAZINE offers a prize of $25 for the best rebuttal.

> "THE MUSIC OF BIRDS.—*Perhaps the most persistent of legends is the theory that the noises of birds, commonly called singing, are musical. The notion has been born solely out of the sentimentality of love-smitten and befuddled numskulls. In such instances as a few first-rate musicians, e. g., Beethoven, have employed bird sounds in their compositions, they have done so only in humorous, aye, in semiderisory, terms. The best way in which to detect the utter absence of anything genuinely musical in a bird's chirpings is, curiously enough, since the method seems to have escaped persons almost entirely, to listen closely to them. If what issues from a bird's throat is melodious, then what issues from a nanny-goat's is a song by Schubert. The so-called singing of a bird, appraised by a man with a practiced musical ear, is precisely of a piece with the sounds produced by an ungreased wheelbarrow axle. There is six times more genuine loveliness of tone in a river barge whistle, and ten times more in a soup spoon struck against a china spittoon.*"

In order to qualify for the prize, the statement in answer to Mr. Nathan must be submitted according to the following rules:

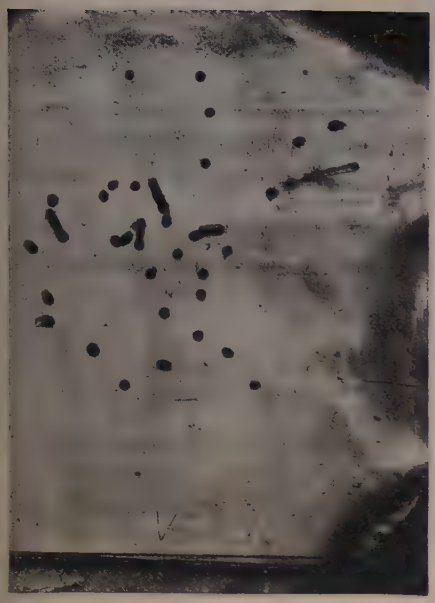
(1) It *must not exceed 200 words* in length, the number of words devoted to the subject by the critic.

(2) It must be received in this office not later than December 1.

The best statement and other announcements relative to the contest will be printed in the January issue of NATURE MAGAZINE.

No statements will be returned unless specifically requested and accompanied by a stamped, self-addressed envelope.

Send all statements to: **Contest Editor, Nature Magazine, 1214 Sixteenth Street, N.W., Washington, D. C.**



DAMAGED SHEET ALLOY

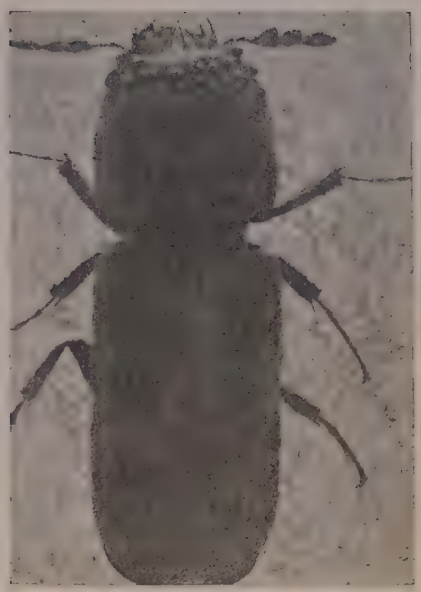
It was wrapped over a section of infected wood but the borer was not stopped.

In his article in the January issue of NATURE MAGAZINE, Dr. Snyder told an interesting and, even, startling story of the damage done by termites, or white ants. In this article Dr. Snyder tells an equally remarkable story of insects with strange appetites.

INSECT METAL WORKERS

By THOMAS E. SNYDER

Entomologist, United States Bureau of Entomology



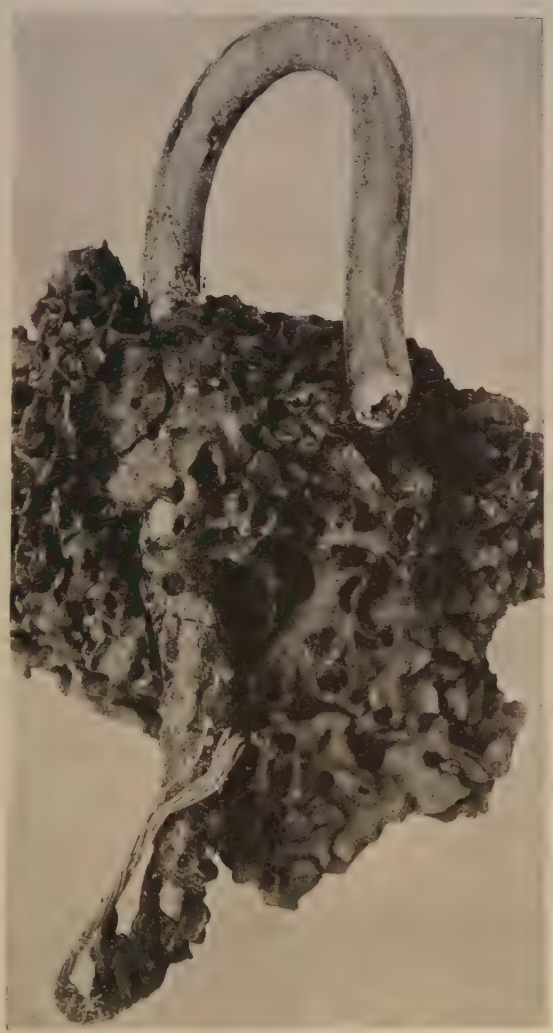
AND HERE IS THE CULPRIT

Greatly enlarged view of the lead cable borer. Note the competent head.

THAT WE have insects who are accomplished workers in wood, and insects whose specialty is masonry, is well known. But we also have insects who occasionally choose metal as a field for their activities. While the story of the steel rails that were destroyed by insects has been proved a "humbug," metal destruction by these intrepid workers is a fact, occurring more commonly in the Tropics, but also in the temperate regions of both Europe and America.

In an endeavor to be helpful in the problem of national defense, "Bugs" Baer proposes to use the lead borer in war by exporting it to eat the helmets from the heads of the enemy soldiers. Once so denuded, he points out, the fighting men would then catch cold, influenza and quinsy from standing bareheaded in a damp trench. The only difficulty with Mr. Baer's excellent proposal is that the insects would have to be carefully trained. Except in a few cases the boring activities are the result of the metal blocking the exit of an emerging adult insect or appearing in the path of a burrowing larva or worm. The suggested warriors would have to be schooled in squads right, deploying formations and the details of direct attack.

Seriously, however, our automobiles and radio sets are safe from attack by boring insects. On the other hand depredations are performed and insects of many different kinds are involved. Beetles, however, are the more common culprits and include the most injurious species. Among the metal boring beetles are included "powder-post" beetles that normally work in wood and reduce its fiber to powder-like consistency, weevils, flat-headed and round-headed wood borers, "timber worms," wood-boring "ambrosia" beetles, and "darkling" beetles. Other insects are the larvae of wood-boring moths, termites or "white ants" and wasp-like insects—horntails.



THE WORK OF TERMITES

Electrical apparatus on Panama Canal lock corrided by termite carton nests.

Lead is the metal most commonly injured. Such varieties of products are attacked as lead bullets and cartridges, lead, and also, tin roofing, lead rain gutters, lead stereotype plates, lead piping for both water and gas, lead lining of vats, tanks and cisterns, the sheet lead protection for beehives, lead crucibles, the lead sheathing of aerial telephone cables, high tension cables, and lead cables in underground conduits. Other metals attacked by insects are tin, zinc, which has actually been found in the stomach of the borer, the quicksilver lining of mirrors and gilded chandeliers.

The most common extensive and serious injury to metal by insects is that caused to lead sheathing of cables. Such damage occurs throughout the world. Another interesting type of injury which occurs fairly commonly is that caused by hide and larder beetles *(Dermestes)* to tubular lead telephone fuses.

Injury to lead wired fuses by insects is most uncommon in the United States. The purpose of the fuse is to protect the telephone

apparatus from high currents; its action is to melt or "blow," thus grounding the high current and preventing further damage. The wire or tape of the fuses is chiefly lead, although hardened with the addition of tin or antimony. By eating through the lead the insects make it necessary to replace the fuse just as if it had been blown out. Both adults and larvae of *Dermestes vulpinus* Fab. have been found in these tubular fuses.

A much more extensive and serious type of injury is that caused to aerial lead cables. This injury is due to the attacks of various species of Bostrichid powder-post beetles and occurs throughout the world. Just recently serious injury by this type of beetle has been reported from Turkey, occurring on both shores of the Golden Horn, the Bosphorus and the north shore of the Marmora. The insect in this case was *Xylobiops sexdentatum* Oliv.

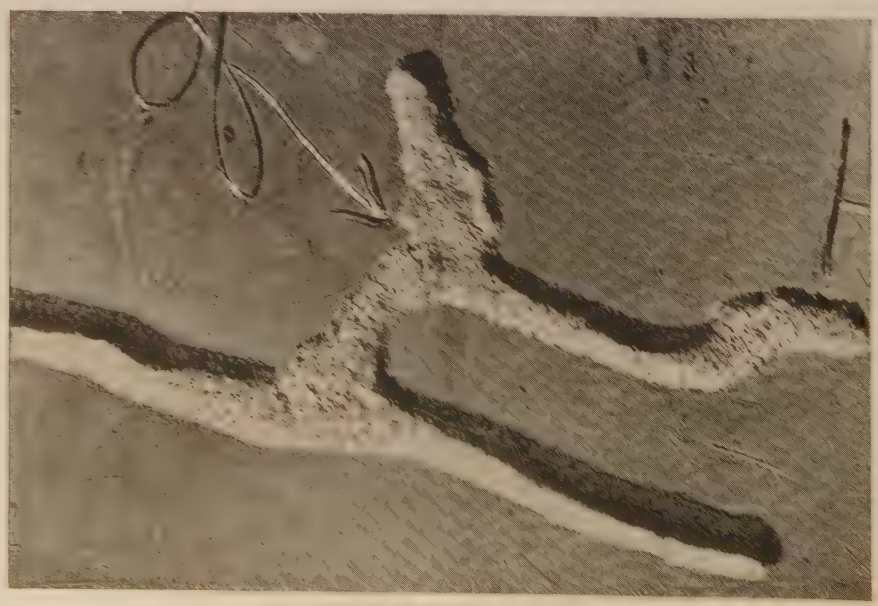
In the United States such injury by *Xylobiops basilare* Say, had been reported from Georgia, Texas and California as early as 1903. By far the greater number of cases have occurred in California, where the injury is due to the wood boring Bostrichid beetle, *Scobicia declivis* Lec., called the "California lead cable borer" or "short circuit beetle." However, "bug" damage may occur in other sections of the United States and be attributed to lightning damage as was formerly the case in California.

Scobicia declivis is a common insect throughout central California at elevations ranging from sea level to four thousand five hundred feet. The beetle also occurs in Oregon, it being recorded from Hood River and Ashland.

The California lead cable borer normally infests the wood of recently felled trees and stumps, "catfaces" on living trees or cordwood. It also attacks the trunk and branches of dying trees. It reduces the wood to a powder-like consistency and the beetle is one of the so-called "powder-post" insects.

"POWDER-POSTED" LIVE OAK

Fibers reduced to powder-like condition by the California lead cable borer.



BRANCHED BURROWINGS IN LEAD

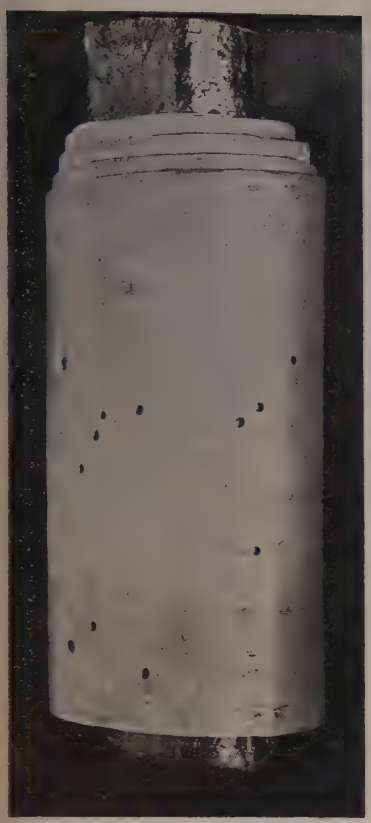
Ample evidence of the borers' ability to penetrate metal if the conditions demand it and to make itself quite at home.

A large variety of host trees, forest and city shade trees such as California live oak, other oaks, California bay or laurel, acacia, eucalyptus, orange wood, elm and maple is attacked. In experimental rearing cages, adult beetles have also bored into redwood in California and southern yellow pine in Virginia, as well as into a loaf of bread and cork.

By its continual boring and revolving back and forth, occasionally making a complete circle, the female beetle manages to advance as deep as her thorax, about two and one-half millimeters, in from three to five hours, according to the nature of the wood. Males were noticed on a number of occasions assisting the females in the boring operations by pressing their mandibles against the wings. The egg galleries are bored near the surface of the wood usually within one inch, then transversally across the grain. The eggs are deposited in the larger pores of the wood through the adult gallery passages. The egg is peculiar in having a strand attachment, such as is present in the case of Lyctus powder-post beetles.

Normally the only injury done by this beetle is to reduce the fuel value of piled cord-wood. However, it early gave evidence of perverted taste. As early as 1881, Comstock recorded injury to wine casks and oak barrels by this insect. Since then it has inflicted a loss of many thousands of dollars to the wine interests through leakage.

Possibly an inebriated and care-free Mrs. Scobicia mistook an aerial lead telephone cable, which is approximately two inches in diameter, about the size, for a tree branch, such as the beetle normally attacks, and hence a suitable place in which to deposit her eggs and start a home. In her dazed condition she bored into the soft lead. Ever since



PERSISTENT INSECTS

They bored through several sheets of this lead.

then her daughters have done likewise. Prohibition may be the remedy.

The damage which is common in the California fog belt is accomplished by the beetle attacking the cable where it lies in contact with the metal ring through which it is suspended from the messenger wire. In such a position the insect is enabled to obtain a leverage in boring. After penetrating the lead sheathing with a hole about two and one-half millimeters in diameter, the beetle stops. Sometimes, however, the insulation is also penetrated. In reality, the stimulus that causes the beetles to bore into the lead sheathing of the cable is apparently that of contact or thigmotropism.

The beetles emerge from infested wood at irregular intervals and have a long period of activity on the wing—from May to September. The largest numbers of beetles, however, emerge in the first part of July. The damage to the lead cable is done in the spring and summer but is usually not detected, however, until after the fall rains. Moisture soaking through the beetle holes causes numerous short circuits all at once and many telephones are put out of commission by "bug" trouble at the same time over a wide area. This is the real serious point. "Trouble men" have to locate the holes approximately by the electrical contrivance known as the "Wheatstone Bridge." They are kept very busy and have to cover a large area of the country within a short period. After the "trouble" is approximately located, the lineman rides along the heavy cable on a trolley suspended from the messenger and exactly locates the holes and solders them.

Sometimes as many as fifty holes occur in the section of cable between two telephone poles. Bug trouble represents from 60 to 75 per cent of all trouble which is caused to cables in central and southern California. It will readily be seen that the telephone companies do not consider it a laughing matter. At present a temporary preventive is the only remedy which has been found practicable. This consists of an application coating the cables at the point of contact with the suspension ring with hot mutton tallow.

CHECKING UP ON THE INSECTS

Test cables enclosed in a cage for observation of the borers' appetites and tastes in materials.

The problem has been attacked from several standpoints, by the Federal Bureau of Entomology, in cooperation with telephone companies. After a study of the biology of the insect was made, the next step was to work with poisons, chemical repellents and preservatives, then various alloys were experimented with in order to harden the commercially pure lead. Finally different types of suspension rings were tried.

The beetles after emergence have entered sections of live oak wood through carbolineum, chlorinated naphthalene, pine tar, lead arsenate, enamels, paints, splicing compounds and friction tapes. The various varnishes, waxes and petroleum greases were entirely ineffective. Of course the insects probably do not normally take these chemical repellents, preventives, or the lead of the cable sheathing into their stomachs. In some cases insects boring through lead do take the lead into their stomachs. As yet no alloy or abrasive has proven effective against attacks by the California lead cable beetle.

It is easy to understand how this beetle is able to bore through compartively soft commercial pure lead which can be scratched with a finger nail, but the lead alloy with three per cent tin makes a hard metal rather difficult to bend and not easily scratched. The alloy containing six per cent antimony is distinctly harder than the four and three-tenths per cent alloy, yet both were penetrated. Nevertheless, if the beetle can bore through a live oak knot, lead will not stop it. Only sheet steel, pure rubber and soft fibrous material such as cotton offered definite resistance to these beetles.

It will be seen that this insect has progressed from a diet of sugar and starches flavoring cellulose to perfectly good oak barrel staves saturated with California's rarest wines, and finally is attacking lead. This certainly is abnormal and is not due to a preference for the taste of lead. Possibly it is only a habit something like the chewing gum habit, since the lead is very soft and yielding to the mandibles of the insect.

Later tests of methods and materials to stop wood-boring and metal-boring insects have been made by the

EATEN THROUGH

The tape within the fuse was severed by the insect.

Bureau of Entomology. The Bureau of Standards has perfected a method of spraying metal on various materials.

As a test of sprayed metal as a wood preservative to prevent attack of wood-boring insects, these same metals were sprayed on small blocks of pine and ash wood. These sprayed test blocks were shipped to Panama where they were placed in contact with the ground on Barro Colorado Island, Canal Zone, in our termite resistance test plot. Only brass, copper and zinc have withstood the test after one year's time. Termites penetrated tin, aluminum and nickel.

Exposed to the weather and ground moisture the sprayed metal chipped off and oxidized. Indoors it stood up better.

A few years ago entomologists would have cried, "Impossible!" to some of the habits of insects which are today accepted as commonplace. What will insects do next? "Lyctus powder-post" beetles are attacking airplane stock (including wooden framework and propellers), the finest grade of seasoned ash stock. If insects continue to attack airplanes and planes add to their altitude records, entomologists may find insects in heaven, if they get there themselves.

Thescelosaurus—A Bird-Footed Dinosaur

By Charles W. Gilmore

Curator of Vertebrate Paleontology, U. S. National Museum

DURING the Upper Cretaceous geological period, the same age in which the *Triceratops* and the *Trachodon* lived, there were many other and smaller kinds of dinosaurs of which nothing is known further than the finding of their scattered teeth and a few fragmentary bones. It is, therefore, of the greatest interest to the paleontologist to find a good specimen of any of these little known forms. Some years ago the unpacking of some boxes that had been in storage in the U. S. National Museum for more than twenty-three years disclosed the well-preserved skeleton of one of these unknown animals of Upper Cretaceous times, much to the surprise of those in charge. Since this animal was new to science it became necessary to give it a name, and it was designated *Thescelosaurus neglectus,* the last or specific name being suggested by the seeming neglect of keeping it in storage for so long a time.

THESCELOSAURUS

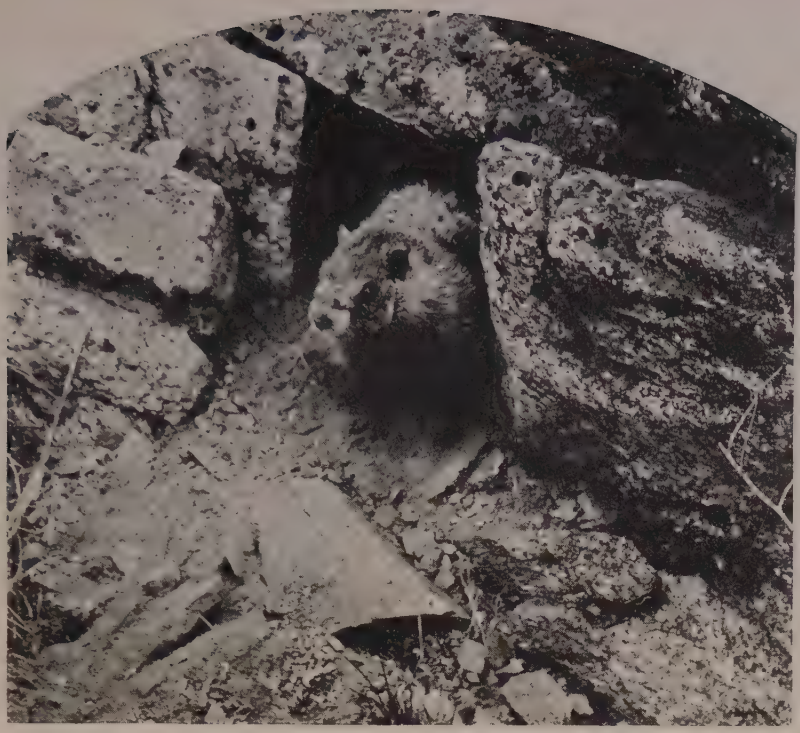
This dinosaur was a graceful and agile reptile of the ages past.

Thescelosaurus was a plant-living reptile, with a small head, a flexible neck of moderate length, and in life evidently agile and graceful in movement. In walking about, this animal must have progressed entirely on its hind legs, for the forelimbs were so small and short that they could only have been brought into use to sustain the body when this creature was feeding from the ground. The tail was long and tapering, equaling one-half the entire length of the animal, which was about twelve feet. The tail undoubtedly served as a counterbalance to the body when the upright bipedal posture was assumed. Extending both ways from above the hips, the back was strengthened by a series of ossified tendons, small, attenuated bony rods, that lay along either side of the upper processes of the vertebrae, thus giving additional strength and rigidity to this portion of the back in order to bear the strain of the overhanging body and tail when the animal was moving about on the hind legs. The hind feet have three functional bird-like toes provided with flattened claws, and the foot structure as a whole implies that *Thescelosaurus* was more of an upland animal rather than an inhabitant of swampy regions.

This dry land environment may in part account for the rarity of its remains, for it is a well-established fact that animals dying in swampy places stand a much better chance of their skeletons becoming fossilized than those dying on dry ground. In order to have bones petrify certain favorable conditions must exist. After death the bones are quickly protected from the air, and about the only way this happens in Nature is by being covered by water or at least buried in moist ground.

Remains of *Thescelosaurus* at the present time are known only from Wyoming, Montana, and South Dakota, although continued explorations will doubtless show their geographical range to have been much more extended.

In the model restoration an attempt has been made to show what the animal looked like when the skeleton was clothed with flesh and skin, and to express the light agile nature of *Thescelosaurus* as is so clearly indicated by the structure of the skeleton and the walking ability of the hind limbs and feet. The character of the skin, doubtless, was scaly as it is known to be in other members of the Dinosauria family.



PHOTOGRAPH U. S. BIOLOGICAL SURVEY

A FAMOUS AMERICAN WEATHER PROPHET

Mr. Ground-hog caught in the act of making his annual long-range weather forecast.

Ground-Hog, Pimpernel & Company

By Charles Fitzhugh Talman

United States Weather Bureau

Monmouth, Kan., Feb. 1. —John Willheimer, skeptical about the theory that the ground-hog regulates the length of winter, purchased five ground-hogs last fall and established them in a home with proper environments on a creek bank here. From a hidden observation tower close at hand, Willheimer will watch the ground-hogs' billet tomorrow. "I intend to settle this thing for myself, anyway," Willheimer said today.—*New York Times*, Feb. 2, 1921.

A NOBLE effort to solve a scientific problem deserves to be remembered, regardless of its outcome. Darius Green is immortal, though he failed to fly, and Willheimer's unique experiment, announced in the paragraph above quoted, should not be permitted to sink into oblivion, even though, as reported in the next day's intelligence, it ended in a complete fiasco. As the great Newton had a mischievous dog, Diamond, to frustrate his undertakings, so the Kansas experimenter had a young son, devoid alike of moral principles and zeal in the cause of science, who, by spiriting away the five prophetic animals before their reputed powers could be put to the test, defeated one of the most remarkable attempts ever made to determine whether a costly Weather Bureau ought to be supported by the United States Government. Of course it ought not to be—or at least its prognosticating functions ought to be discontinued—if it is true, as mankind has believed for ages upon ages, that Nature provides, without expense to the taxpayers, a host of trustworthy weather prophets among the lower animals and the members of the vegetable kingdom.

Some of the earliest known expressions of this belief are found in the writings of classical antiquity—such as Virgil's "Georgics," the Greek verses of Aratus, and the Greek prose of Theophrastus—while the latest are published from day to day in the newspapers. Notions on the subject embodied in the folklore of different countries are so numerous and varied that a mere catalog of them would fill several pages. The fullest record of such ideas is that contained in Richard Inwards' "Weather Lore."

PHOTOGRAPH U. S. BIOLOGICAL SURVEY

AN ALLEGED SIGN OF A HARD WINTER

The building of houses by muskrats is not, however, a trustworthy weather prognostic.

Every American, even though he may never have laid eyes on a ground-hog—alias woodchuck—is familiar with the tradition concerning this animal, which forms part of the stock in trade of the newspaper paragrapher. On Candlemas Day, February 2, as the story goes, the ground-hog wakes from his winter sleep and comes forth to make his annual long-range weather forecast. If the sun is shining, so that he can see his shadow, he foresees

NOWACK'S WEATHER PLANT

Its promoter claimed that *Abrus precatorius L.* would foretell weather changes and earthquakes.

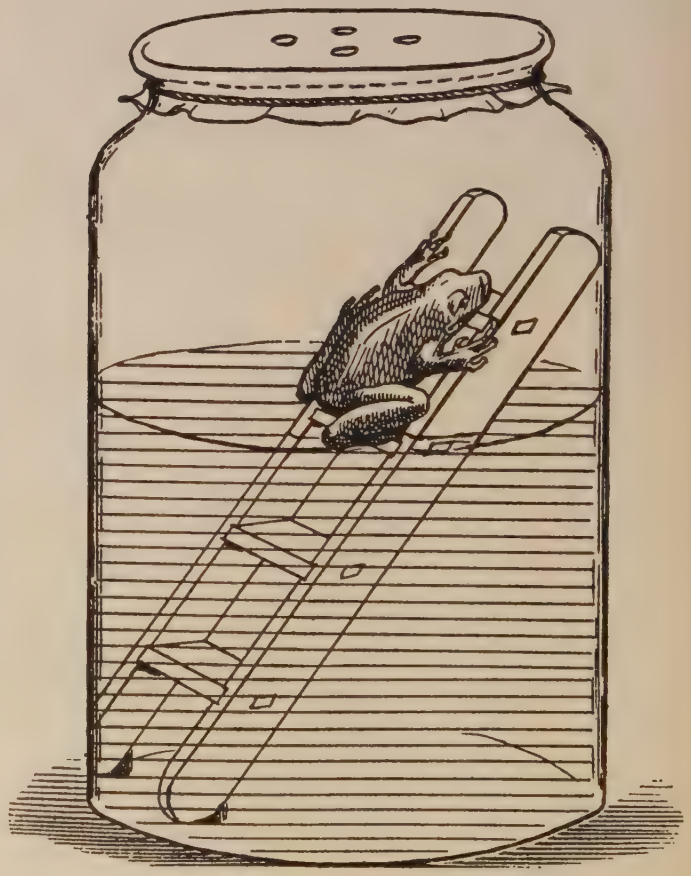
more cold weather and goes back for a further nap of six weeks. If the sky is cloudy, he knows the winter is over, and does not return to his lair.

While some of the weather folklore current in this country was acquired from the Indians, the bulk of it came over with the early settlers from the Old World, being, in many cases, adapted to fit the new environment. The Candlemas Day tradition was imported from Germany, where, however, a bear or a badger figures as the prophet instead of a woodchuck. The current German version, in turn, is elaborated from an ancient legend which, without regard to the habits of any animal, ascribes prognostic significance to the weather of Candlemas Day. Many other dates in the calendar have likewise been supposed to indicate, by their weather, the character of subsequent days or seasons. St. Swithin's Day still enjoys its old repute in this respect.

Probably in our more or less enlightened age few people are credulous enough to take the ground-hog story seriously, but there are various other traditional ideas concerning animal weather prophets that flourish as vigorously as ever they did in the past. As often as autumn rolls round the newspapers regale us with the sage announcements of hunters and trappers concerning the outlook for a severe or mild winter, as deduced from the amount of food stored up by wild animals, the thickness of their fur, or other portents of a like order. Beavers are said to build their homes much earlier before a hard winter than before an open one; the opossum is alleged to take up his winter quarters in a hollow tree if the season is to be mild, and underground in the opposite case; and so on.

No enterprising journal has ever, we believe, selected a corps of expert students of animal life, equipped them with scales, tape-measures and other appropriate paraphernalia, and sent them into the wilderness at the approach of winter to collect data that might subsequently be digested in the form of a seasonal forecast a little better authenticated, as to its origin, than the haphazard prophecies with which we are familiar. Strange to say, neither have naturalists tried seriously to find out how much truth, if any, there is in popular ideas of the sort just referred to. A well-known exception is the case of the late Dr. Charles C. Abbott, who long kept a record of the years in which muskrats built winter houses—traditionally a sign of a cold season to follow—in the neighborhood of his home in New Jersey, and also of the relative amounts of food stored each autumn by gray squirrels. He could find no relationship between these events and subsequent weather.

The fact appears to be that none of the lower animals are more successful than man has hitherto been in predicting the weather of coming seasons. On the other hand, many of them are good weather prophets at short range; probably much better, indeed, than the average human being who



DRAWING BY R. INWARDS

A GERMAN HOUSEHOLD WEATHER PROPHET

When the tree-frog climbs to the top of his ladder, some "authorities" say it means fine weather.

has no weather maps or scientific instruments at hand to correct his personal impressions. Some of these creatures are extremely sensitive to variations in atmospheric conditions. An interesting observation bearing on this point was made by Dr. Harlow Shapley, the well-known Harvard astronomer, who discovered that the speed at which ants move depends upon the temperature of the air. The relation is so definite that, for some species, the temperature can be determined within a degree from the time of running through a "speed-trap," as shown by a stop-watch. At 100 degrees the ants went twelve times as fast as at 50 degrees. Weather changes do not, as a rule, come abruptly, and it is likely that most animal species have acquired, in the course of their evolution, the faculty of recognizing—or instinctively reacting to—the gradual onset of those varieties of weather that materially affect their welfare.

Many animal weather signs have been more or less plausibly explained on this basis. Rightly or wrongly, the moisture of the atmosphere is most often invoked in such explanations. It is said, for example, that bees are sensitive to the increase in humidity that precedes a shower, and always return to the hive in time to escape a wetting. In some cases a less direct relationship is supposed to exist between an animal's behavior and the state of the atmosphere. Thus swallows fly low before a storm because their prey, the insects, fly low at such a time. The real weather prophet is said to be the insect, who is incommoded by the condensation of moisture on his hairs, and who seeks the low levels at which, as the storm approaches, the relative humidity is less than it is aloft. When we know more about animal psychology we shall, perhaps, be better able to explain some of the other manifestations—especially those of a noisy character—with which beasts, birds and insects herald the changes of the weather; and by that time we may also be wiser than we are at present concerning the various "weather neuroses" to which human beings are subject. That the victims of rheumatism and neuralgia are living barometers; that pains and other sensations in the stumps of amputated limbs give notice of coming rain (as in a classic case described years ago by Dr. Weir Mitchell); that some persons have a special "phobia" inspired by thunderstorms, and begin to feel uncomfortable before the storm puts in an appearance—these things are matters of common observation, but are still shrouded in mystery, despite certain learned dissertations in regard to them that have appeared in Germany and elsewhere.

There are two animals in particular that have been much used as domestic weather prophets. One is the common European tree-frog or tree-toad (*Hyla arborea*). In Germany and Switzerland it has been the custom for generations to keep these little creatures indoors, where they vie in

DRAWING BY DR. C. F. MILLSPAUGH

PIMPERNEL

The prophetic powers ascribed to this plant have earned it the name of "poor man's weather glass."

BY R. BRUCE HORSFALL

THE YELLOW-BILLED CUCKOO

Known as the "rain crow," because its noisy cries are supposed to be a sign of rain.

popular repute with the toy man and woman of the "weather-house." The frog is kept in a glass jar half full of water. A little ladder enables him to ascend to the upper part of the jar, and when he does so it is supposed to be a sign of fair weather; the higher he mounts, the finer the weather expected. Some "authorities" state just the reverse of this.

The other household weather forecaster is the leech. This animal is also kept in a jar or bottle, party filled with water, but as it can creep up the side of the vessel no ladder is required. The leech is said to become very restless before storms, and there are a number of rules for predicting the weather from its movements and attitudes. A truly remarkable intrument, shown at the Great Exhibition of 1851 in London, consisted of twelve jars, each containing a leech. The contrivance was so arranged that a bell rang whenever one of the imprisoned prophets rose to the top of his jar, and this was supposed to mean that stormy weather was on the way. The inventor, Dr. Merryweather, called this merry weather instrument a "tempest prognosticator," and published a book about it, in which he advised the establishment of government storm-warning stations, equipped with "prognosticators," along the British coasts!

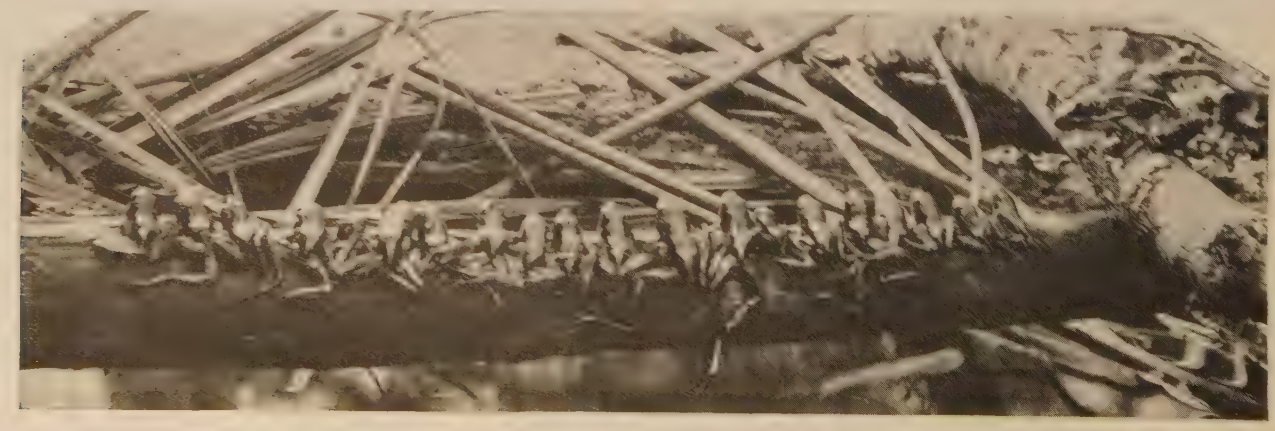
One more reputed weather-indicator belonging to the animal kingdom deserves mention here on account of its newspaper celebrity. The goosebone—that is, the breastbone of a roasted goose—is supposed, both in this country and abroad, to show, when the bird is eaten in the autumn—the English rule says after Martinmas—what the following winter will be like. A thick bone is said to denote a hard winter and a thin, nearly transparent one a mild and open winter. A mottled appearance means changeable winter weather—according to the widespread traditions on this subject, which are, of course, utter nonsense.

Plants, like animals, are supposed to furnish a variety of both long-range and short-range weather indications. Thick husks on the ears of Indian corn are said to foretell a severe winter, and the same augury is drawn, in the spring, from abundant blooming of dogwood in this country, and of hawthorn in the Old World. When acorns are plentiful a cold winter is expected, while a large yield of beechnuts is thought to have the opposite meaning. There are several more of these plant portents relating to coming seasons—all without scientific foundation.

Many plants exhibit certain movements in response to variations in moisture, temperature, sunlight and possibly other atmospheric conditions, thus furnishing some slight clues to weather changes near at hand. The movements classed as "hygroscopic" are due to the absorption of moisture from the air. They occur in dead tissues as well as in the living plant, and thus such things as oat beards and convolvulus stems are occasionally used in the construction of crude hygroscopes for indicating the humidity of the atmosphere.

Probably the most celebrated of weather plants is the pimpernel (*Anagallis arvensis*), which has earned the name of the "poor man's weather glass" because of its alleged habit of closing its petals before rain. Its reputation appears to be quite unjustified. The present writer has often found the blossoms wide open both before and during a shower, and the same observation has recently been reported by Mr. N. L. Silvester in England, who, however, finds that the blossoms are never fully open when the relative humidity of the atmosphere is above eighty per cent. The pimpernel normally opens its blossoms a few hours after sunrise and closes them, even in full sunlight, a few hours before sunset. Many other plants are reputed to close their blossoms before rain—and this has been explained as a means of protecting their pollen from being washed away—but botanists have made few critical studies of such movements. Clover, wood sorrel and several other plants with compound leaves fold their leaflets in the so-called "sleeping" position during daylight in certain states of the atmosphere, which may or may not precede a shower. In the case of white clover, Mr. Silvester finds that the folding occurs only with strong winds.

Toward the close of the last century a species of pea, *Abrus precatorius*, acquired a great deal of notoriety in Europe as a "weather plant." Its promoter, an Austrian named Nowack, claimed to be able to predict not only storms and weather changes, but also earthquakes and the occurrence of firedamp in coal mines, from the varying positions assumed by its leaves and branches. As he could not monopolize his method of prediction by patenting the plant, he patented a special case for holding it. He took his vegetable wonder to London, where it attracted so much attention that the authorities of Kew Gardens eventually published a bulletin explaining its complete unreliability. Nowack is said to have sacrificed a fortune in his efforts to get his fantastic notions accepted by the world at large.



PHOTOGRAPH CORNELIA CLARKE

"TWENTY FROGGIES WENT TO SCHOOL
DOWN BESIDE A RUSHY POOL.
TWENTY LITTLE COATS OF GREEN."

DON Q IN THE EAST

By Eleanor B. Pack

PHOTOGRAPHS BY THE FINLEYS

HE FOUND ONE OF THE COLLIE DOGS

Don Q jumped up on the tawny back and snuggled down in the warm fur with a sigh of content.

"CA-CUCKOO, ca-cuckoo," called Don from his perch on the shelf in the sun porch. Dawn was breaking and the soft light gradually threw shadows over the ferns and flowers which grew luxuriantly around him. He had arrived the previous night in his new eastern home and had been too sleepy to investigate his new surroundings.

With a ruffling of feathers he stood on tip-toe, and again his voice rang out in a clarion call of greeting to a new day. A whir of wings fanned the ferns as he flew down to the floor and began to trot around, clucking like a contented domestic chicken. He picked up pieces of dirt, and scratched meditatively on the Indian rug for some time before he discovered the pan of dust. There it lay exactly in the center of a pool of warm sunlight. He jumped into it and squatted down in the yellow sand, now rolling on one side and ruffling it into his feathers, then on the other, occasionally stopping for a short doze in the golden sunlight. Don did not sleep in the manner of humanity, for instead of closing his eyes as eyes should be closed by lowering the upper lid, his lower lids raised up.

His bath was interrupted unceremoniously by the entrance of two collie dogs which pushed open the glass door of the porch and rushed to the goldfish pool on the floor for a drink. Don had been used to dogs of a sort, but his western companion had been a small, mostly fox terrier, so these two large tawny animals were a surprise to him. He was not frightened, however, and as the dogs merely glanced at him curiously and then went to a corner to lie down, he dismissed them from his thoughts and continued his explorations.

Footsteps approached, and soon Don spied a pair of shiny tan shoes on the doorstep. With a rush he was upon them, pecking vigorously, and crowing a challenge now and again by way of livening the fight. The shoes advanced. Don cared not that they were strange shoes, belonging to a new friend; all were alike to him. He retreated several steps, only to make a new rush and land on the shoes with feet outstretched like a fighting cock. Then, tiring of this play, he decided to rest a while, and so he contented himself with clucking softly as he trotted round and round the shoes.

Conversation buzzed above Don's plumed head. "I wonder if he'll fight a hand as well as a foot."

"Oh no, dear," answered a gruff voice; "he is still strange. You mustn't scare him."

"Oh, but I want to try," said the feminine voice; and slowly a hand was extended toward Don — a hand on which a shiny ring glittered dazzlingly in the sunlight. Don ran towards it and there ensued a friendly fight, in which the hand pushed the quail away, that he might rush upon it anew, crowing as he came, "How dare you! How

This month we spend the winter in the East with Don Q, who finds new experiences in the home of the Associate Editor. This remarkable California quail afterwards made the return journey across the continent to his home and his friends on the Willamette where he still prospers.

BOOTS, BOOTS, BOOTS—MOVING OR STILL

They are Don Q's passion, his challenge to combat, his own true love, an obsession beyond explanation.

dare you!" The further he was thrown back and the rougher he was treated, the more he enjoyed it. No wonder that he was called Don Quixote, for no knight ever fought his windmills more valiantly than the little quail fought this antagonist. Presently in the excitement a head of brown bobbed hair was lowered within range of Don's vision. This was indeed a new foe. He flew up again and again, each time pulling out a hair in his attack. Don was excited by this new sport, and each time the owner of the hair shrieked as Don ruthlessly plucked out a few, he replied in kind with a saucy crow.

A sudden whir of wings overhead sent Don Q spinning around, as he whisked himself under a chair to safety. In all his life he had never encountered a hawk or other bird of prey, but some inherent instinct told him that danger lay in the sound of wings from above. He had noticed several canaries in the room, but, as merely caged birds, he had considered them unworthy of his notice. It never occurred to him that they might be given freedom to fly about. Don remained under the chair for some time, thinking over his experience, and finally—seeing that all was well—he emerged from his hiding and with a flirt of his tail began to scratch about in the rug as if nothing had happened. To make friends with the canary after the indignity which that bird had heaped upon him was too much to ask.

Soon after this his new friends left the room, and Don was alone. He crowed and he flew against the glass door, but all to no avail. His world was lonely when human beings were not around him.

Click. The door opened a crack, and a tiny pair of feet advanced unsteadily into the room. Don ran toward them, but only to find them retreating hastily, while their diminutive owner uttered cries of fear. He followed, and found the family seated in the dining-room. He ran under the table to be near their feet, but this was most uninteresting. The feet remained motionless. Presently, however, a bell rang and someone came into the room with some food. Her feet were alluring as they walked about jerkily, so Don charged them from under his retreat. A scream, followed by a crash, sent Don back under the table. He did not know that waitresses are unused to tame quails.

"Well, what are you going to do with him today?" said the editor, as he sat at breakfast and occasionally kicked his foot to let Don Q have a little amusement.

"I think I'll let him follow me wherever he wants to," said his wife, getting up from the table. She walked slowly upstairs and Don Q sprang lightly behind her, hopping from step to step as lightly as a puff of thistledown. Upstairs there were a great many things for the quail to investigate, and so he lost sight of his companion. She, meanwhile, had busied herself with the family mending and, missing the quail, called to him. Don answered the call and soon came tripping into the room and hopped up into her lap. The glistening needle which pulled a long white thread in and out of some fluffy material was just what Don delighted in, thinking it some new sort of game devised for his benefit. He had been accustomed to gather tiny threads from carpets and they agreed well with his digestion, but this long, snaky thread could not be swallowed. What could the matter be! As fast as he swallowed it, it came right out and he never could seem to get the better of it. This was a most unsatisfactory game, so Don's attention began to wander.

BRACED AS THOUGH FOR COMBAT

Perhaps his defiant gesture is in defense of the robin on the cover of the April NATURE MAGAZINE

Suddenly he spied the brown riding boots. Now be it said the riding boots were his particular property. He claimed them as his own, disputing the right of any one to interfere with them, and wherever they led he would always follow faithfully. With a crow of triumph he flew from the lap and landed upon the toe of one of the boots, knocking it over as he did so. Recovering his balance he ruffled his feathers in satisfaction and started to trot round and round the boots, clucking as he went. He did not care that the boots were not animated by the presence of feet; all he cared was that he had found his old friends, and his incessant march was interrupted only by an occasional stop to reverse his direction. No mating pigeon was ever more attentive to his mate than Don to his riding boots. An end must come to all things, however, and after some time a bell rang downstairs to announce lunch hour. The editor's wife arose, put her sewing away, picked up the boots and threw them into the closet, closing the door before Don could follow. Don's feathers bristled in anger, and he fairly shouted as he threw himself against the offending door again and again. He would not leave his boots. After waiting in vain to distract his attention, the editor's wife picked him up bodily like a wilful kicking child and bore him from the room.

Late that evening, as Don was napping on his shelf, he heard the murmur of voices in the next room. He was lonesome, and so he crowed sleepily. A sharp click sounded as the glass door was set ajar. Don stretched lazily, flew down and entered the brightly lighted room, blinking dizzily as he

became aware of the many people who surrounded him. He could not understand why there should be so many people and why the noise of talking was so insistent. He stood a moment in the middle of the floor trying to collect his wits, then slowly and carefully made his way over to the nearest pair of shoes. A hand swooped down from above and he was thrown high into the air. His wings spread instantly and he came down in a curving arc, landing lightly on the floor at the other end of the room. This was indeed a new game to play on a sleepy bird. When he had recovered a bit from his surprise, he decided that he rather enjoyed it, so he approached the same pair of feet again, circling warily as he drew near. Again the hand swooped and again Don was tossed into the air, to flutter down and attack his new adversary with awakened vigor and alertness. Shouts of laughter echoed in the room as Don warmed up to the sport, crowing as he rushed about the room in his excitement. Evening is not the time for quails to play, so, when Don began to grow weary, the editor picked him up and shut him out on the porch, despite his vigorous protests that he should be thus childishly put to bed in the midst of the fun.

IN SILENT CONTEMPLATION

Though usually the most jovial of chaps, Don Q has his moments of reflection about this odd man-world.

One morning Don found to his surprise that the large front door had been left open after the family had gone out. Not wishing to be left out of any new adventure, he followed. A new shining white world greeted his eyes, and he stood on the threshold blinking. Snow was unknown to him, and so he stood a moment trying to accustom himself to the glare. What was his surprise, when he stepped down, to find that this soft white fluffy down was cold. At first he did not mind it, as he found that by picking up his feet as fast as possible he could be quite comfortable. He hopped down the steps and found, underneath some green shrubs, a piece of bare ground. He scratched and scratched, and picked up some of the loosened earth. But he soon began to feel chilly and uncomfortable, and no matter how fast he scratched he could not keep warm. He trotted out into the sunlight and found one of the collie dogs lying there. This was lucky. Don jumped up on the warm back and snuggled down into the tawny fur with a sigh of content. Here it was that the family found the quail a few minutes later.

Spring came, and with the spring came golden days. Don Q went outdoors very often now and dug in the thawing earth while his friends puttered about in the garden. Many new sights and sounds attracted his attention. Some blankets being shaken out of a nearby window reminded him perhaps of the drumming of a grouse, and he rushed across the street to search for it. The robins and song sparrows could not make friends with him, though they were very curious and apparently eager to make his acquaintance. But the earth was stirring and Don was restless. When the editor and his wife urged him to return to the house he was more and more disinclined to follow, and only the appearance of the riding boots could lure him indoors again. Spring was here, and it was time that Don should return to his western haunts where he would be free to come and go as he desired.

DON Q AND HIS EASTERN HOST

Just a friendly little discussion on the matter of focus in particular and photography in general.

And so the long journey was made, with many strange adventures on the way.

COTTONTAIL RABBIT

Sylvilagus floridanus

The American Cottontail combines the characteristics of both hares and rabbits, though he is distinctly smaller than the hares, with shorter legs and smaller feet and ears. The chief distinguishing mark is the fluffy snow-white underside of the tail, always visible in retreat. Various forms are found from the deciduous forests of the east, across the grass-grown plains to the Pacific coast. Cottontail is partial to brushy borders of cultivated lands, where he may make a "form" in which to conceal himself, but he will occupy a deserted burrow in open country if necessary. He lives on vegetable food and is a pest to forage fields and orchards, when his kind becomes too numerous. Several litters of young are born during the summer, in nests made of dead grasses warmly lined with fur from the mother's body. When caught, the young utter little cries of alarm. Average adult length eighteen inches, weight three pounds.

EASTERN WOODCHUCK

Marmota monax

North America has several species of marmots, but the common Eastern Woodchuck is known to everyone as the Ground Hog. Piles of dirt mark the openings of the burrows on grassy hillsides or open fields not too far from bordering woodlands. Within are long tunnels leading to a snug chamber lined with soft grass and leaves, where, in the late spring, three to nine blind and helpless young are born. In a few weeks they fare forth to feed on clover and other succulent plants, never going far from home, for they have many enemies and must be able instantly to pop into their holes at the sound of their watchful mother's shrill, sharp whistle. Woodchucks do not store up food, but eat heavily during the early fall and become excessively fat. In October or November they retire to their dens for a long hibernating sleep which lasts until spring. Length about twenty-three inches, weight eight pounds.

TOWNSEND'S CHIPMUNK

Eutamias townsendii

This is the darkest of the many species of Chipmunk in the western states and ranges along the Pacific coast. It is distinctly larger and stronger than its relatives. The habitat is varied, but old fences, fallen timber, brushy thickets which offer berries, seeds and nuts are favored by this alert little creature. Chipmunks carry their stores in cheek pouches to some specially selected spot, where they leisurely enjoy their meal and leave a telltale pile of shells and seed coverings. The little fellows will chatter sociably until disturbed; then they utter a sharp chirping note and vanish. Burrows with nest chambers and storerooms are their homes, whence they retire to sleep from early autumn till spring. They do not sleep so soundly as other species, and in the southern part of their range they do not hibernate. The young are born in late spring. Average adult measurement is ten inches.

DOUGLAS'S PINE SQUIRREL

Sciurus douglasii

Owing to its home environment, this Squirrel is darker and browner than its relatives, for it inhabits the moist, coniferous forests west of the Cascades in the Pacific Northwest. It is a noisy little animal, scolding or singing as the mood of the moment indicates. At mating time, and again in the summer when the young are trying out their voices, the woods ring with their music. Any edible thing will do for a red squirrel's meal—seeds from conifer, oak, hazel and various other plants; roots, mushrooms, and insects. The nests most commonly observed are those bulky masses of twigs and leaves in a forking branch of some tree; these are lined with soft material and, at any time from April to October, may be the home of from three to seven young. During the winter they live upon the stores collected in the time of plenty, but will migrate to a distant place, if necessary, for food. Average length fourteen inches.

BEAVER

Castor canadensis

Beavers, within their range, occur from sea level to an elevation of more than 9,000 feet. They are heavy, round-bodied animals with short legs, webbed hind feet, a flat scaled tail and chisel-like teeth strong enough to cut down trees. They dig canals on which to float branches and logs for building and food purposes. Dams are constructed in streams to form ponds in which they build conical lodges, with entrances through passages below the water surface. High banks are also used in which to tunnel homes. For winter food, which consists of the bark of deciduous trees, they store freshly cut green twigs, sticks and poles in the bottom of the ponds by weighting them down with mud and stones. Most of this activity takes place at night, though they often work during the day. They probably mate for life and have from two to five young each year. Their average length is about forty-two inches.

MUSKRAT

Fiber zibethicus

Muskrats are purely North American animals. Because of their aquatic habits they are found along streams, in lakes, ponds and marshes nearly all over the wooded part of the continent. Their long scaly tails, flattened vertically, act as rudders when the stocky animals are in the water. The young, several litters in a season, number from three to thirteen, so that there is little danger of extermination at present, though their fur has been extensively used under various trade names. The cone-shaped lodges, built of roots and stems of plants mixed with mud, dot the marshland, each with an oval chamber well above the water level, with passages leading to it from under the water. This is the usual winter home. They are mainly nocturnal in habits. Their usual diet is of roots and stems of water plants, varied with fresh-water clams. The average length is twenty-one inches, weight two pounds.

EASTERN WOODCHUCK—*Marmota monax*

COTTONTAIL RABBIT—*Sylvilagus floridanus*

DOUGLAS'S PINE SQUIRREL—*Sciurus douglasii*

TOWNSEND'S CHIPMUNK—*Eutamias townsendii*

MUSKRAT—*Fiber zibethicus*

BEAVER—*Castor canadensis*

THE NATURE LEAFLETS
PREPARED AND COPYRIGHTED BY
R. BRUCE AND CARRA E. HORSFALL

BADGER—*Taxidea taxus*

OPOSSUM—*Didelphis virginiana*

MINK—*Mustela vison*

NEW YORK WEASEL—*Mustela noveboracensis*

STRIPED SKUNK—*Mephitis mephitis*

RACCOON—*Procyon lotor*

OPOSSUM

Didelphis virginiana

This is the only marsupial found in the United States. The long, hairless, prehensile tail, the naked ears, piglike snout, and the long, coarse hair, together with the widely spread toes, are the chief distinguishing marks. These animals love the vicinity of water and are most numerous in swamps and bottom land bordering streams. Their dens are in hollow trees, and their food consists of almost everything, animal or vegetable, which they gather on their nocturnal rounds. The young, from five to fourteen, are born in an extremely immature condition, but are able to crawl into the pouch, where they remain attached to the nipples for six or eight weeks while they are growing to be miniature editions of their mother and less dependent. Then they cling firmly to their mother's fur and are carried wherever she goes for several weeks, returning to the pouch at times. The average length is about thirty inches.

BADGER

Taxidea taxus

The American Badger is a close relative of the old-world form. Its habitat varies from pine forests or dry tropical lowlands to the northern plains, wherever there is to be found an abundance of mice, gophers, ground squirrels, prairie dogs, or other small mammals; for it is a powerful digging machine and can capture any of them at will. Although a member of the Weasel family, the Badger is not nearly so agile as its relatives, so must make up by strength and courage what it lacks in quickness. It is short-legged and squatty, so slow-footed that a man may overtake it, but when brought to bay it fights viciously. Usually a solitary animal, it is shy and retiring in nature so that not much is known of its family life, but there are generally three or four young. The length of adults of this member of the family is about twenty-eight inches, and the weight is fifteen pounds.

NEW YORK WEASEL

Mustela noveboracensis

This Weasel is one of the larger varieties which change their brown summer coats to snowy white in winter. The tip of the long tail is jet black and contrasts strongly with the winter pelage. Their flattened heads, slender necks and lithe bodies, together with keen eyesight and hearing, extraordinary celerity of movement, and courage, make it possible for them to follow their prey anywhere. Hares, cottontails, all kinds of rodents and some birds need to keep a sharp watch, both day and night, for these creatures will unhesitatingly attack an animal much larger than themselves. Burrows are found under ledges, stone walls, or in hollow trees. They have one litter of from four to twelve. The young remain with the parent until quite grown. Despite the persecution to which they expose themselves, their number is practically undiminished in most of their original area. The adult is about fifteen inches long.

MINK

Mustela vison

This is one of the most widely known fur bearers of the North American Weasel family. It is long-bodied and heavily proportioned, while its short legs and arched body cause it to walk slowly and clumsily; but, if it wishes to get over the ground rapidly, it moves in a series of springy bounds. However, it swims with ease and thus obtains fish, frogs, crayfish, or clams as a part of its food, supplementing the diet of small mammals, moles, mice and rats. Though largely nocturnal, it is a very restless creature and is sometimes active by day. It chooses an old muskrat hole or cranny in the rocks in which to build its nest of grass and leaves, lining it with hair, feathers and other soft material. There is a single litter of from four to twelve young, born during April or May. They remain with the mother throughout the summer, but make homes for the fall. Length about fifteen to twenty inches.

RACCOON

Procyon lotor

The Raccoon is found only on the North American continent and is common in most wooded portions of the United States with the exception of the high mountain ranges. He is an expert tree climber and makes his home in the hollows far from the ground. The family consists of two to six young, who use the same den until grown, and even then they travel together. The raccoon is nocturnal and hunts along the banks of streams, where he finds clams, crayfish, frogs and plant food, all of which he carefully washes before eating. Raccoons are very intelligent animals and make interesting pets. Their hind feet rest flat upon the ground, while the front toes are separated so that the foot may be used as a hand. Food is ofttimes discovered by the sensitive touch of those fingers in advance of either sight or smell. The average length is thirty-two inches, weight fifteen to twenty pounds.

STRIPED SKUNK

Mephitis mephitis

Striped Skunks are found over much of North America, except on waterless plains or in deep forests. They favor areas of mixed woodland and fields or brushy places near water. Their homes may be in deserted burrows, hollow logs, or holes of their own digging. A nest of grass and leaves at the end of the tunnel serves as the home for four to ten young until they are old enough to follow the mother on her nightly forays for food. They feed chiefly on injurious rodents and insects. Skunks walk on the soles of their feet and, when mildly displeased, stamp on the ground with their front feet and growl. The family remains together through the winter and enters into a state of semi-hibernation for the coldest months. When this period is over the family scatters to find other fields to conquer. They average two feet in length and weigh seven to ten pounds.

THE HIBISCUS—HAWAII'S FLOWER

By Lorin Tarr Gill

MILES of red-flowered hedgerows; clustered bushes laden with pink, bell-like blossoms; spacious gardens harboring thousands of orange and yellow blooms; and, in the native forests, tall trees covered with pale waxen flowers, trailing their perfume in a softly stirring silence. That is the hibiscus in Hawaii. And where, of the hundreds of tourists who visit the Paradise Isles each year, is there one who is insensible to the flaunting beauty of the territorial flower? From the day that the traveler first comes upon the Crescent City lying like a great botanical garden beneath her sheltering palms; from the moment that he steps from the gangplank of his steamer and inhales the dizzy fragrance of her threaded flower wreaths—leis of love—the spell of Hawaii's floral beauty is upon him.

The impression deepens as he drives toward his hotel, for, a few blocks beyond the central business section, the streets are lined with the hibiscus blossoms and every garden and vacant lot is graced with their vivid hues. A trip through the residence district is through a riot of blooms gracing the homes of dwellers under mid-Pacific skies. Small wonder, then, that before he has been in Honolulu a day, the visitor realizes that the hibiscus flower contributes no small quota to the far-famed loveliness of Hawaii-nei!

A LARGE DOUBLE HIBISCUS

This beautiful flower is found in either red or in pink and is a cultivated variety.

No matter what time of year he may arrive he will find the hibiscus to greet him, though the flowers are naturally at their best after the heavy rains of late winter or early spring. If the visitor is an early riser—and what Nature enthusiast is not?—he will always delight in watching the buds unfold their exquisite chalices as the sun breaks through the night clouds on Oahu's mountain tops and spread their petals to rare perfection in the summer days.

Yet, perhaps for the benefit of the newcomer who has not learned the full joy of the subtropical climate, many types of the hibiscus open later in the morning and some especially accommodating flowers, anticipating, it seems, the need for dinner-table decoration, open in the afternoon. Sundown of the first twelve hours finds most kinds tightly closed and drooping slightly on the stem, whether they have been plucked to bring beauty to some decorative scheme or have been left alone to nod away the perfumed hours. Some, however, will last throughout the evening, and several of the rarer cultivated blossoms do not fade for two or even three days.

A rather remarkable trait of the well-loved flower is that often, after it has been plucked, the petals will turn back, gradually returning again to normal several hours later. A silent protest, it would seem, against such despoliation.

Nowadays it is difficult to find, in all the island group, a garden which does not display some variety of the hibiscus—so widely is it used as an ornamental shrub and hedge plant—and nowhere else, it is said, has it been brought to such a high standard of perfection.

The habit of growth of the different forms varies enormously. Small dwarf shrubs with dainty blossoms are seen gracing many a well-kept lawn. Large bushes vie with flowering trees for attention in nearly every fence corner. Growing wild in many of the forested districts are trees thirty or forty feet high and covered with thousands of fragrant blooms. Each flower is six or eight inches in diameter with a stamen ten inches long—a sight which lingers in the memory forever. Some types are densely tufted, others have a long, whip-like growth with sparse lateral branches, and many are heavily covered with foliage throughout.

While there is almost unlimited variation in shades of hibiscus colors, the extreme light limit of the scale being pure canary-yellow and the darkest, red, there are only three main colors in addition to white which are directly

concerned in the flower pattern. They are red, yellow, and orange.

More than half of all the varieties would be classified as pink, yet, in the majority of cases, the pink is merely diluted crimson. In many of the pink flowers the eye is crimson while the various shades are faded, at times, into the merest pink wash in an almost white flower. Often there is more or less of the pure scarlet color, and then there is the dilution—the scarlet pink. There are all mixtures of crimson and scarlet combined in various forms with a tinge of yellow or orange. No blue has been found in any of the forms and, therefore, there is no shade which can be called lavender, with the possible exception of one variety which is tinged with mauve on its petal edges. Color sports there are, of course, flowers of half yellow and half salmon, or, occasionally, of salmon color throughout. Often the shade will change somewhat as the plant grows older, resulting in a darker or lighter flower.

Hibiscus blossoms are arranged on a plan of fives and assume three general types of shape. In the majority, the corolla, when fully opened, is in salver form and the petals vary from the linear to the obovate; but the coral hibiscus and all of the hybrids from that parent have more or less recurved petals with wavy, scalloped edges.

The staminal column is an important feature of hibiscus beauty, as it is from one and a half inches to six inches or more in length and has, in the different forms, a greater range of color than is shown by the petals. In double blossoms it is modified into an unusually large number of the latter. The leaves vary within wide limits in all of their chief characteristics. Some are rough and hairy, others are softly pubescent, and many are perfectly smooth and shiny. As a rule when the trunk and main stem have a dark-colored bark, the twigs are green; while, when the bark of the older wood is light in color, the twigs are reddish or brown.

HIBISCUS IN THE GARDEN

Mr. and Mrs. G. P. Wilder are enthusiasts about this flower and have varieties named for them.

A LARGE SINGLE HIBISCUS

This is a cultivated flower and is found widely in any shade of pink or yellow.

Hibiscus is a large genus, consisting of not less than one hundred and eighty species, and belongs to the order *Malvaceae* (mallows), thus making it a distant relative to the ordinary cotton of commerce. A number of native species are found in Hawaii, as well as introduced species which have served as a basis of hybridization in multiplying the great number of available varieties in daily cultivation. It is evident that hibiscus lovers, in their travels about the world, have lost no opportunity of obtaining desirable types for planting.

A native white flower (*H. arnottianus*) occurs on the island of Oahu in several distinct forms. The Tantalus is found in the mountains back of Honolulu; the Punaluu grows in a section on the windward side; and the Nuuanu is named for one of the city's beautiful valleys. Kauai, the garden island, sponsors the Knudsen, Rice and Lydgate whites — all named for prominent old-time families.

The Kokio ula or Pualoalo (*H. kokio*), though somewhat rare, is seen in a number of native red forms known as the Oahu, Hakalau, Molokai, Kipu, and Kawaihapai types. On Kauai is found one (*H. kahilii*)—named, probably, because of its resemblance to the feathered standards carried by the early Hawaiians — which

grows on a tree all of thirty feet high, the scarlet flower being three and a half inches across the petals. There is a native hibiscus with almost five-inch sulphur-yellow flowers (*H. brackenridgei*) which grows to a height of twenty feet, the blossoms having a small crimson spot at the throat of each petal. There is a rare native species called the Hauhelewai (*H. youngianus*) which has a low bushy growth and carries a three-inch funnel-shaped pink-lavender flower with a small crimson eye and a deep crimson column. It grows in marshy land and old, abandoned taro patches and was once so plentiful in many parts of the islands that "aho" or thatching sticks of the native houses were made from the stems.

HIBISCUS ADORNS THE HOME IN HAWAII

Gardens and hedgerows are beautiful with these flowers and the visitor is struck by their prevalence.

Some remarkably beautiful crosses have been produced in the islands, among which is the Ruth Wilcox, a six and a half inch flower, pure white with crimson column and scarlet stigmas. It opens at noon, lasts two days, and has a delicate perfume. There is the May Damon, a five-inch almost white blossom with the back of the petals crimson-pink; the Woodrow Wilson, which expands to six and a half inches in a light crimson-pink; a nine-inch flower, the G. P. Wilder, delicate pink with a pink column; the Lillian Wilder, seven inches, which is a delicate crimson-pink with darker veins and a crimson eye; the Sarah Wilder, a large flower with a crepe-like texture of rich crimson; and the Alonzo Gartley, an orange-scarlet blossom nearly five inches in diameter. Many others have also been named for well-known Honolulans.

Then there are those rare members of the family whose genus has been established in Hawaii and which, at the first glance, seem to be the common haw tree, but whose peculiar deep magenta flowers, having large, yellowish tuberculate seed-capsules, show them to be the genus *Hibiscadelphus* or "brother of the hibiscus." Visitors seldom see these interesting trees as there are only about three specimens on the islands. The first species (*Hibiscadelphus giffardianus*), named for Walter M. Giffard, of Honolulu—the first person to hybridize the Hawaiian hibiscus—grows at Keeauhou, Hawaii. The second (*Hibiscadelphus wilderanus*), of which there is but one tree in existence, is named for Gerrit P. Wilder, of Honolulu, an ardent hibiscus lover, and flourishes on the slopes of Kahikinui, southern slope of the extinct crater of Haleakela, Maui. The third (*Hibiscadelphus hualalaiensis*) is found on the slopes of Mount Hualalai in North Kona, Hawaii.

There seems to be no doubt but that the hibiscus follows very closely the laws of heredity as laid down by the Mendelian theory, and thus it has become an exceedingly valuable plant for the scientific worker. Hundreds of types, however, have been produced by the amateur enthusiasts of Hawaii, and extensive cultivation is predicted for the future.

Another Queer Quirk

LOOK for Bruin in this picture. This is not a picture of a frontier settlement where bears are so numerous and curious as even to investigate the roofs of buildings. Such a thing might happen in the frozen wilds of Alaska, but not in a peaceful, perfectly civilized New Jersey village, where bears are not encountered except in circuses and zoos.

No wonder Miss Katherine D. Crane, who sends NATURE MAGAZINE this photograph, rubbed her eyes and took another look one day last winter when she looked out of her window. It was a bright sunshiny morning after one of the fiercest gales of the winter. There was an enormous black bear apparently nibbling in the snow on the roof of a neighbor's garage. The wind had etched this wonderfully realistic black bear in the midst of the blanket of snow, and the sunbeams were dancing about as though in glee at the curious eyes peering from neighboring dwellings. Miss Crane shares this novel sight.

THE GILA MONSTER IS A COLORFUL FELLOW

This reptile is sluggish and not particularly pugnacious, but its bite is poisonous and sometimes fatal.

STRANGE MEMBERS OF THE LILY FAMILY

The Joshua tree is a distinctive denizen of the desert, neither a palm nor a cactus, but often mistaken for one or the other.

Denizens and Dwellers of the Desert

By Ernest McGaffey

"A LAND that is lonelier than ruin"—thus has the desert been described. How well put that is, one is apt to think at first glance. Gray and illimitable stretches of sagebrush and greasewood; gray and wide-reaching areas of verdureless sands; gray and distant mountain peaks, with not a tree or shrub to relieve their naked outlines; gray skies dipping to a gray horizon; and over all a blazing sun that seems to shatter its lances against the flinty landscape—these are what the desert seems to be.

THE OCOTILLO

This is also a distinctive desert growth adding to the charm that is the desert's own.

But look carefully! Linger and the desert will enfold you in a charm of its own, grip you with the world of color, of movement and of mystery that it really owns. As April melts into May comes a wondrous change to the pallid sands. Whole acres burgeon gleaming wild flowers which spread a luxuriant carpet, in colors a challenge to the

rainbow. Like a blush to the cheek of a sick maiden, they light the wanness of the desert. Poppies set desolate slopes ablaze with their cloth of gold, and the bright-blooming cactuses flaunt their gorgeous blooms.

To know the desert is to grow to love it. The cactus growth has its distinct beauty. In clumps and groups the giant cactus rises to thirty feet or more. Here and there are prickly cholla, or "jumping cactus," mingling with its relative, the ocotillo. Thirst is supposed to be a synonym for the desert, and Nature has stored within the visnaga cactus a fluid which, acrid though it may be, will relieve grip of water hunger.

THE SCORPION IS NOT DANGEROUS

Like the centipede, rattlers and Gila monster, however, it is not a good camping companion.

A grotesque member of the lily family is the Joshua tree, a true desert growth. Gaunt and twisted, growing usually in twos and threes, these trees seem to be neither tree nor shrub—too stunted to be the first and too grotesque to be the last. Many of them are blackened by fire. Some are rotted down and broken off. They serve as bonfires for desert wanderers, although sage-brush and grease-wood are more easily gathered.

In the distance one may see what seems to be a column or puff of smoke. Perhaps a wanderer's campfire? But no; it is the tree that some Indians call "smoke tree," another denizen of the desert with an individuality all its own. The dusky foliage of this relative of the mesquite seems from afar to be a smouldering mass.

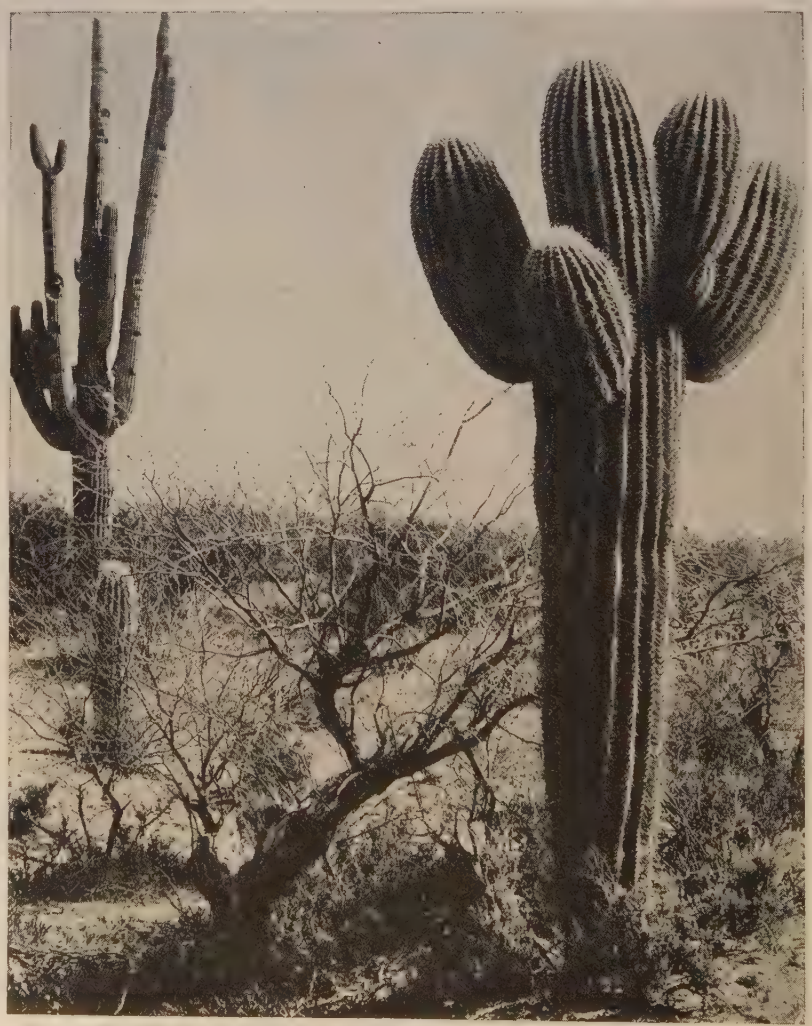
Just as the desert is individual in its growths of trees and flowers, so is it in its birds, its beasts, its reptiles. The tawny-gray coyote lopes cautiously over the levels and hollows, merging his lank form into the surrounding grease-wood and sage-brush. Awkward and shambling, the jack-rabbit ambles along the desert spaces. His preposterous ears give this natural prey of the foraging coyote the semblance of an undersized jackass.

Lizards dart frequently across the trails of the desert traveler. It may be the tessellated lizard, the spiny swift, the collared lizard or the chuckwalla, but whichever, it is interesting. In desert dryness flourish the horned toad, another kind of lizard; the hairy and pugnacious tarantula, venomous spider of the southwest. One may come upon at least three of the rattlesnakes, mayhap the side-winder, the red rattlesnake and the common rattler of the Pacific region.

In the Gila River desert districts of Arizona and New Mexico, the traveler will find the Gila monster, large and poisonous and far from beautiful to view. Though this fellow is sluggish and not especially pugnacious, its glittering yellow or pink and black makes it easily seen. The camper in the regions inhabited by this desert denizen should be cautious, and the scorpion and centipede are other desert dwellers whose intimate acquaintance is generally avoided.

Against the desert skies the buzzard is an occasional sign of life, and even at a considerable distance from water the desert quail is found in flocks.

And here we find that marvel of the insect world, the Pronuba moth, which emerges from the ground about a week before the desert yuccas open their creamy bells to the desert air. Snowy white, brown underneath, she hovers around the blossoms, apparently aimlessly. But study her. She is carrying golden pollen from the anthers to the stigma of the flower, industriously pushing it down the opening of the pistil. Blind instinct teaches her this pollination is necessary in order that the seed ovules may develop, thus insuring a supply of food for the tiny Pronuba babies which she will never see. She bores into the seed pod and lays her eggs close to the developing food supply. A week, and the eggs have developed into the larval state. Here they are cradled for about a month before they bore their way through and drop to the ground, there to remain until the next summer, when they complete their life cycle.



THE CACTUS IS A DESERT DENIZEN

Here are three individuals of the suhara or giant cactus, a notable member of the family, in different stages of growth.

A VANISHING AMERICAN

Female holly trees with berries are becoming a scarcity because of unwise cutting.

PRESERVING OUR CHRISTMAS GREENS

By P. L. Ricker

President, National Wild Flower Preservation Society

ONE OF our nationally known cartoonists has immortalized the phrase, "Somebody is always taking the joy out of life." Few of us wax enthusiastic about the "joy-killers," and in discussing the problem of preserving our Christmas greens there is no need of such a viewpoint. We are, nevertheless, confronted by a situation that has progressed far beyond the realm of theory. We are faced by the fact that annually there is a destruction of plants, shrubs and small trees so extensive and so shortsighted in character as to rob coming generations of these joys because of our own prodigality.

There is no need today to deprive ourselves of many of those things considered an essential part of Christmas. But there is distinct need of the use of common sense in employing what we have and in thinking of what our children will have. Parents, owners of wild land, civic clubs and citizens generally must face the facts and cooperate to prevent much of the heedless waste of native plants.

We can go about this task in four ways. First, of course, there may be a voluntary reduction in the amount of wild plant material used for decorative purposes, and the use of a similar amount of artificial substitutes, which are appearing on the market in better quality and variety. They will continue to improve as the demand increases. A second method is using preserved material which may be put away and used year after year.

A nation-wide demand for this type of decoration will produce the supply. Thirdly, we may use cultivated plant material in place of the wild, and again the increased demand will encourage the production of this material. And, lastly, we must educate owners of wild land to protect their property rights, to use economical methods of cutting and to preserve their own material.

The greatest amount of wild material used at all seasons of the year is from the mountain laurel which is found from Maine to Florida and west to the Mississippi River. It is rare in most parts of northern New England and increases rapidly in abundance towards the south. Many thousands of acres of it are injured or destroyed every year by fire. One New York dealer alone uses three hundred tons of the leafy branches annually, and the entire New York market uses about one thousand tons a year. Much of the material is stolen, and all is cut without regard for new growth. Owners should divide their holdings into four or five parts and only allow one section to be cut over each year. It hardly pays to cut over land yielding less than a quarter of a ton to the acre, and some land would yield several tons. On the minimum yield owners should receive two dollars and fifty cents per acre.

The American holly is in the most serious danger of any of our native woody plants. It is found mostly along the coast from Massachusetts to Florida and west to Texas. In its northern range it is already becoming scarce. In the winter of 1924 the small State of Delaware shipped 13,979 cases of holly by one railroad alone, each case containing two hundred wreaths. As large a quantity was shipped by water, and very much larger quantities were undoubtedly shipped from the eastern parts of the other coastal states, particularly New Jersey, Maryland, Virginia and Texas. As

A SPRIG OF MISTLETOE PHOTOGRAPH E. L. CRANDALL

Long an integral part of the Christmas decoration, mistletoe is really a parasite on trees, damaging them.

the red berries are borne on female trees, these have been largely cut in the past, the whole tree being often sacrificed or else losing nearly all of its branches so that it soon dies. During the past two winters complaints have been very general that few of the berries were found, the blame being laid on seasonal conditions. On the contrary, this destructive cutting of female trees is largely responsible. The trees left are mainly male and non-berry-bearing, and at the present rate of cutting the days of the male trees are numbered.

To provide red berries for the holly wreaths the closely related winterberry is also being rapidly destroyed. It is, however, now possible to get very attractive artificial red berries wholesale at from twelve and one-half to forty cents a gross in one hundred gross lots, depending on the size of the berry, and a very good artificial holly leaf spray, with berries, up to fifteen inches long from $2 to $39 per gross, depending upon the size. Wreaths made from preserved or artificial sprays of holly evergreen or friz, in sizes from four to thirty inches in diameter, cost from $13.50 to $400 a hundred, depending upon size and quality of material; and special assortments of eight and two hundred dozen lots of artificial materials are sold for $16.50 and $17, respectively. They would furnish an excellent assort-

A WREATH FROM THE WEST

California redwood combined to red toyon berries to make an effective Christmas wreath.

PHOTOGRAPH C. R. SHOEMAKER

WINTERBERRY IS POPULAR

With the disappearance of berry-bearing holly, these berries are being called upon to serve.

ment for making up a considerable number of wreaths or decorative groups.

There is a good profit for nurserymen, or others, in growing berry-bearing holly plants for the market. Three- to six-inch cuttings from the heaviest berry-bearing trees taken in October or November without removing the leaves should be planted in a box six inches deep and containing a one-inch layer of moss in the bottom and two inches of sand. The box should be covered with glass and kept in a greenhouse or room ranging from seventy to eighty-five degrees during the day and preferably not below sixty degrees at night. A good watering once or twice a week is ordinarily sufficient. The cuttings should be well calloused in thirty days and have roots one-half to one inch long in sixty days, after which they may be potted up and placed outdoors as soon as the danger of frost is over. Potting soil should preferably contain one-quarter by bulk of sawdust that has been rotting four or five years to aid in keeping the soil acid, although aluminum sulphate at the rate of thirty pounds to a cubic yard of soil may be used and added subsequently in small quantities. The plants also may be mulched with the well-rotted sawdust, oak, pine or laurel leaves. Plants should make nine to twelve inches' growth the first and each subsequent year.

A few male plants should be planted in all nurseries to insure fertilization, and the cuttings may be selected from large non-berry-bearing trees. Most of the female plants should bear berries in three to four years. Some nurserymen graft a female branch into a male tree so as to form two main trunks, male and female side by side. Berry-bearing plants, from cuttings or grafts, two to eight feet tall, sell from seventy-five cents to $10, and a good crop of plants to cut for branches for the Christmas market when they are five to six years old should bring proportionate returns. Fair-sized single branches sell in the market for from twenty-five to fifty cents each. The winterberry may be propagated similarly to the holly.

The European holly often is slightly larger than the American holly and has a glossy instead of dull leaf surface. One or two large farms in Washington and Oregon are already doing a large business cultivating the European holly for the Christmas market and last year shipped it in quantity as far east as Chicago.

Due to a less dense population in the far western states, there has not as yet developed quite the problem in preserving native Christmas greens that there has in the east, with the exception of the holly in Texas, where it is being destroyed fully as rapidly as in the east. On the Pacific coast some reduction of the supply of Oregon grape, salal, huckleberry, holly-leaved cherry, toyon berry, redwood, Douglas spruce and white fir has been made. The toyon berry is mostly used for its red berries on wreaths of other foliage. It is cultivated to some extent by nurserymen as an ornamental shrub and is widespread in the lower mountain ranges, where it is often found in such impenetrable thickets that it would seem hard to exterminate. However, western conservationists should watch their supply of native plants.

Ground pine or crowfoot is extensively used for wreaths and is more in danger of extermination than any of the other materials. It does not yield readily to cultivation. If only the short leafy branches were cut instead of the entire root,

PHOTOGRAPH E. L. CRANDALL

LAUREL LEAVES AND BLOSSOM

This plant is called upon all the year to serve as decoration and suffers accordingly.

SOME OF THE WREATHS OF THE CHRISTMAS

Here we have hemlock, holly and two kinds of ground pine wreaths. They can be treated and preserved for year to year use.

the plants pulled up, there would probably be sufficient new growth to nearly hold the ground pine's place in Nature. Fortunately this material may be readily and indefinitely preserved when properly prepared, and more and more of the preserved material is appearing on the market each year. It is found both in sprays and wreaths with attractive clusters of pine cones, plain or silvered, and other preserved materials attached.

Artificial fibrous material known as friz, in red and green colors, and in chains and wreaths, forms an excellent substitute for part of the native Christmas greens. It may be obtained at a moderate price at most department and chain stores, and an increasing number of small red decorated friz wreaths are being used to decorate the rear windows of automobiles at Christmas, and the larger sizes for home window decorations in place of holly and ground pine, holly-leaved cherry and redwood wreaths.

For many years the florist's trade has had a great variety of preserved leaves for decorative purposes at all seasons. These have been largely galax, maple, elm, oak, linden, and magnolia, and in green, dark-red and brown colors. These leaves keep their natural pliability for years and rarely drop from their branches. It is only within the last few years that the process of preparing these leaves has been applied to any extent to ground pine and holly. This practice, if more extensively followed, will be one of the best methods of conserving the native supply of these plants.

The process consists of first bleaching the leaves to be preserved by placing the leafy branches in a large glass, wooden, cement or enameled receptacle containing javelle water. This is a strong corrosive solution and must not be placed in contact with any metal or allowed to get on clothes.

Javelle water is made by putting four pounds of sal soda (also called sodium carbonate and washing soda) into a glass or enameled vessel with one gallon of water and boiling ten minutes. One pound of bleaching powder (also called chloride of lime), free from lumps, is then added. When cold this is strained into a jug or large bottle and kept tightly corked. Metal receptacles will be destroyed by it, if allowed to stand. For large quantities the same proportions may be followed, the result strained into a wooden or cement vat and used at once.

Different leaves require different strengths of solution. Leaves like oak with a large amount of tannin in them require that the javelle water be diluted with one-fourth the quantity of water, while most other leaves require the solution to have one-half its quantity of water added when used. Some delicate leaves like asparagus and maidenhair fern require a still weaker solution. Most leaves will have the green color entirely bleached out in ten or twelve hours, and some less. After bleaching, the leaves should be thoroughly washed in running water to remove the bleaching solution, after which they are placed for a few minutes in a receptacle containing a green dye of as nearly the natural color as possible. Other colors may be used if desired. The dye should be kept just below the boiling point and must be a dye suitable for dyeing cotton goods.

After dyeing, the material should be washed again in running water to remove surplus dye and then placed in a 5 per cent glycerine solution for about one-half to one hour as the material may require. It may then be placed on racks to dry. The glycerine keeps the leaves in a fresh and pliable condition. If it is desired to fireproof the material, it may be placed in a solution of ammonium phosphate before drying.

Mistletoe is one of the few plants not adapted to this preserving method. There does not seem to be very definite information as to whether Christmas use has materially lessened the supply. It probably has, but the plant is a parasite on the trees on which it grows and often causes considerable injury to the trees so that it is hardly advisable to include it among the plants needing protection.

A number of states have laws for the protection of their native plants, but they are very difficult to enforce unless owners of the property will take an interest in obtaining warrants for arrest, and in most of the states having such laws they have had no appreciable effect on vandalism.

A PHOTOGRAPH OF THE OFFENDER

Greatly enlarged view of a colony of the most commonly found species, *Balanus balanus*, alias Bill Barnacle.

THE BAFFLING BARNACLE

By Henry A. Gardner and Captain Henry Williams, U. S. N.

Here the authors present the criminal record—the dossier, as the French say—of a notorious criminal, Bill Barnacle, whose field of crime is the sea. They also tell an illuminating story of other marine enemies of society, including Tommy Teredo and Larry Limnoria.

HE LOOKS something like a rosebud; his friends have the appearance of a blade of grass; his thousand and one relations seem like everything you have imagined in your dreams. The family is prosperous, content and healthy and multiplies to an extent far beyond biblical injunctions.

The total effect and result is a waste to the world running up into something like a hundred million dollars a year, figuring money alone. What it costs in wear on tempers, in loss of time, in physical exertion can never be calculated.

With these words we have the doubtful pleasure of introducing to you Bill Barnacle, whose unwelcome presence the combined science of the notable quarter of a century we have just left behind has been unable to banish.

Barnacle is the name that is popularly used to cover all the marine growths of whatever kind that attach themselves to the bottoms of vessels, and next to edible fish they have the greatest economic importance of any marine animals. Of every ton of coal or barrel of oil used to propel ships a portion is expended in giving barnacles a ride. It is estimated that the United States Shipping Board spends in the course of a normal year somewhere around twenty-five million dollars for fuel. Due to the increased resistance to propulsion caused by these growths—or fouling, to use the technical term—the fuel consumption is increased about 1 per cent for each week elapsed since a ship has left the dry-dock. Assuming that the average Shipping Board vessel is dry-docked once every six months, it will be seen that on a conservative estimate the annual fuel bill of the Shipping Board may be increased as much as 12 per cent, or three million dollars over what it might be if fouling growths could be prevented.

Taking these figures as a basis, it is safe to estimate that of the fuel consumed by the approximately twenty-eight thousand merchant vessels which sail the oceans, seventy-five million dollars' worth of fuel a year is wasted. And this takes no account of the loss resulting from reduced speed and consequent delays in reaching port.

But this is not the limit of the damage caused by marine fouling. The wooden piling of the unnumbered wharves and piers which line the world's coasts and river banks are also attacked by water creatures that cause tremendous damage. One can have a graphic illustration of this condition by examining the piling on any beach or wharf when the tide has gone down.

To combat the depredations of these costly marine pests, the United States Navy, the United States Bureau of Fisheries, and experts on colors and paints have combined to evolve means of discouraging growths on vessels, concentrating their experiments at the Bureau of Fisheries Laboratory at Beaufort, N. C. In the face of the talent thus gathered to slay the barnacle he seems to have small chance of surviving; but when last heard from he was going fairly strong, though exhibiting signs of great fright.

It is safe to say that as long as there have been sailing ships on the seas their bottoms have been fouled—covered often with dense masses of crustaceans and other marine organisms, clinging to them and growing rapidly in size. These have lengthened their voyage, interfered with their seaworthiness, and at times led to shipwreck. Expeditions to far distant lands have failed because

ships' bottoms have become fouled. Maritime wars have been lost through the living impediments which the warships were forced to carry.

Yet, despite this age-old problem, it cannot be said that our knowledge of marine organisms is by any means complete. A very large number have been classified, the structure of many has been studied, and names have been given to many different species. We know something of their habits of reproduction, but our knowledge ends with this. They are of great variety and diversity of form, of both animal and vegetable species, many of them grotesque and bizarre in appearance and habits, and with life histories that have no parallel among the creatures better known to us.

AN INSTANCE OF MARINE FOULING

This is what happened to the starboard propeller of the U. S. S. *Edwards*, damaging the blades.

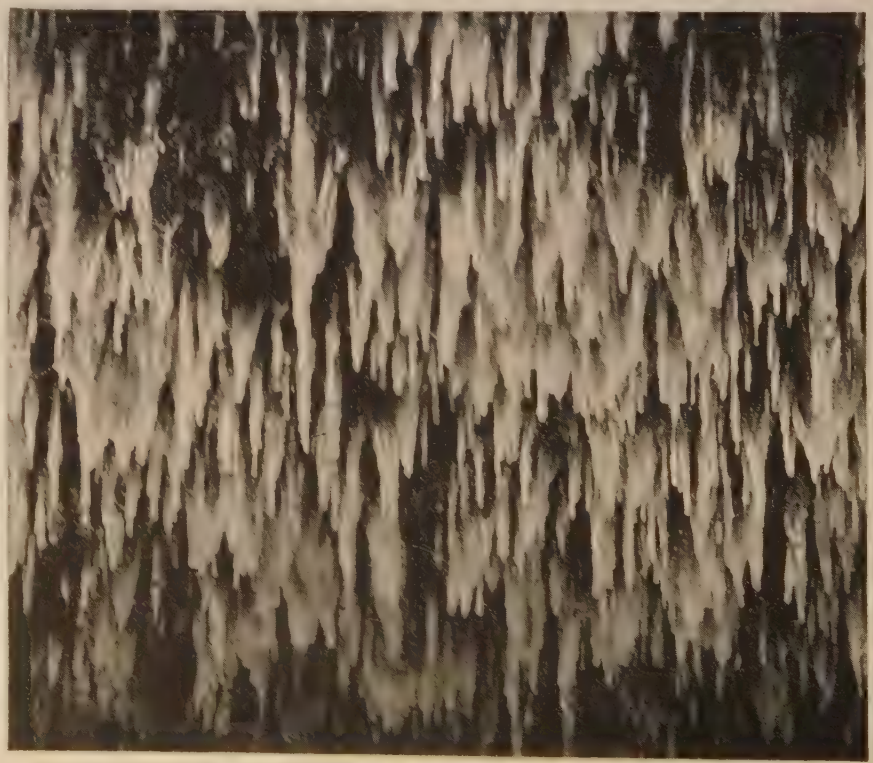
Of the several kinds of marine animals that attach themselves to ships' bottoms, the most important are the barnacles. The true barnacle belongs to the crustacea or crab family and has a truly complicated life history. The parent barnacle fertilizes its own eggs, which it retains within its shell cavity until they hatch. Then the young issue forth veritably in clouds, each parent barnacle producing millions.

The young barnacle, once released into the water, is in a free-swimming active form. It is so small as to be barely visible to the naked eye. When you do see it it resembles somewhat a minute water flea. After several moults the barnacle changes his form again and becomes a tiny bivalve, like a mussel, called a cyprid. The cyprid continues to swim freely but is provided with antennules with sucker discs by means of which he can attach himself to the first comfortable spot that offers itself and strikes his fancy.

Needless to say the life of this strange creature is a hazardous affair. Provided with no means for defense, it becomes the prey for fish and other things, and of the incalculable number of offspring which the parent barnacle sends out, only a small number live to attach themselves to some solid object, there to grow up and in their turn send out families.

The food of the barnacle are the minute organisms which teem in sea water. It draws them in by its feather-like legs, which it extends and waves back and forth to create a current that will carry the food to its mouth. The great scientist, Huxley, aptly described this method of feeding when he said: "The barnacle may be said to be a crustacean fixed by its head and kicking the food into its mouth by its legs." It seems almost incredible that such a living thing exists in this world. Doomed by Nature to be attached by its head for life, it yet has found a way to obtain its sustenance.

The barnacle is truly a hard-shelled individual and, once he becomes attached to his home, nothing but a chisel wielded by a muscular human hand can dislodge him. He is able, like a clam, to close himself up in the shell, and there he has ample protection against invaders of his person as well as against the poisons that are brought to bear against him when he chooses a ship's hull for his home. The barnacle can stay shut up in his shell for hours, and does, if he finds the surrounding water suddenly become unpleasant. When exposed to the air he closes up in the same manner until, his curiosity aroused, he opens his shell to investigate.



NO, NOT A CAVE INTERIOR

This picture shows the fouling of the starboard side, aft, of the U. S. S. *Hewshaw*, and the effect on sailing is obvious.

Another kind of marine life which is responsible for fouling is known in the vernacular as "grass." These are shoots of grass-like appearance which grow from the actively swimming young which has attached itself to the ship. At the tip of the shoot is the animal itself, looking like a flower on a stalk. Any number of these stalks are shot up by the original single young.

Barnacles and

"grass" are not destructive in themselves, causing only a serious impediment to the locomotion of the vessel. But there are other sea creatures which are actual destroyers. These are the boring mollusks, *Teredo, Bankia, Martesia* and *Pholas*.

The *Teredo* or ship-worm is the most destructive to piers and wharves. It has a worm-like body, and on its head are tiny but powerful shells. These shells act like a drill, and no wood can resist them. The *Teredo* bores its way into the piling and remains there, rapidly growing in size. At the tail-end of the worm are two tube-like organs called syphons which extend into the water. Should the condition of the water be unsatisfactory, the syphons are withdrawn and the hole plugged fast and tight by another pair of organs called pallets.

So prolific are these ship-worms that a single pile may easily contain one hundred thousand, though there is no outward evidence of this fact except numerous little specks. The specks are the entrance holes, often no more than one one-hundredth of an inch in diameter.

A CHRONICLE OF DESTRUCTION

Teredo depredations on timbers. The ones in sound condition had been coated with a toxic paint preparation.

The *Pholas* differs from the other three species in that its affection extends to rock or hard clay instead of wood. It has even been known to bore into concrete.

There are also crustacean borers which excavate small galleries beneath the surface of the wood. They are so numerous that frequently a square inch of wood surface contains two hundred of them. In a short time the wood so affected is thoroughly honeycombed, and it breaks and floats away to sea. One can see this at beach piers, where the piles look as though pieces had been chewed out of them.

These *Limnoria*, as they are called, are seldom longer than a quarter of an inch. Harassed human beings, however, prefer them to the *Teredo*. The latter can destroy a pile in four months, while it takes the *Limnoria* at least a year to send the same pile to its watery grave.

PHOTOGRAPH U. S. FOREST PRODUCTS LABORATORY

LIMNORIA AT WORK ON A DOCK PILING

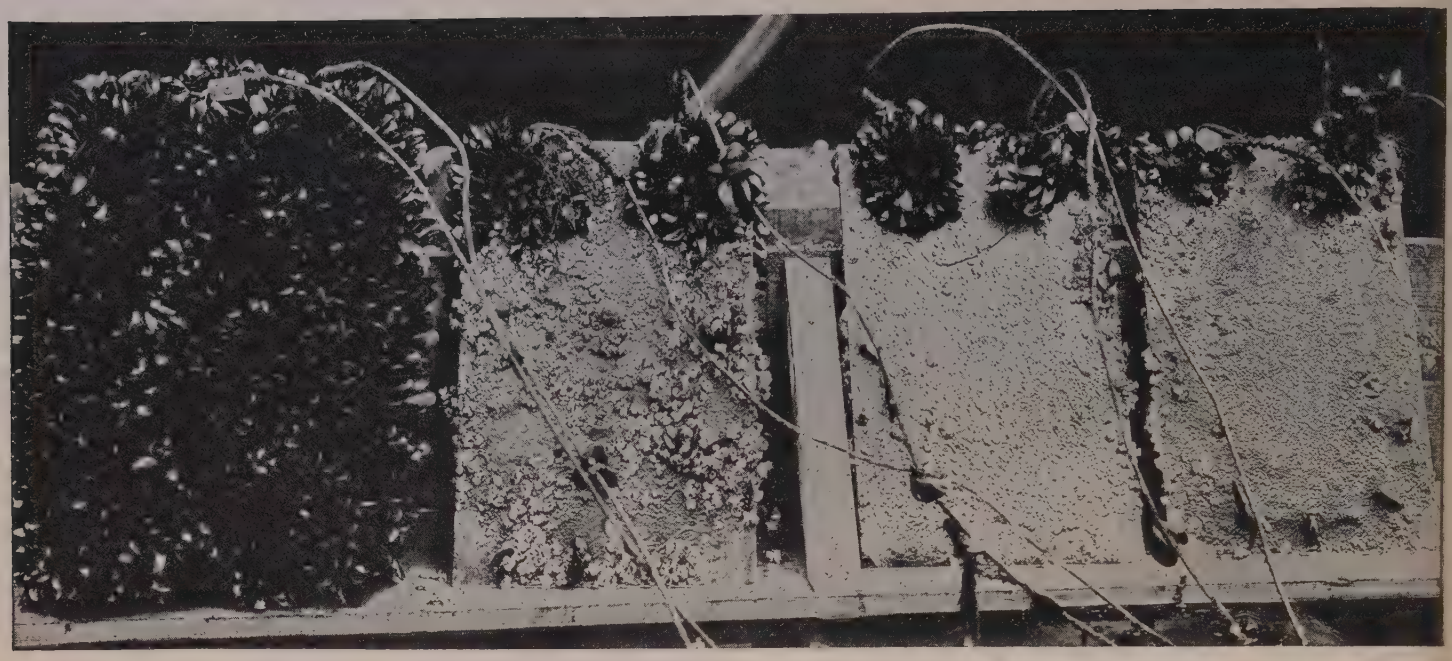
Generally it takes this criminal a year to destroy a pile that his fellow criminal, Teredo, can destroy in four months.

While piling may be partially preserved from attack by impregnation with creosote, copper solutions and other chemicals, obviously the only remedy that can possibly be devised to conquer the barnacle menace to shipping is paint. And wonderful have been the formulas prepared by hopeful chemists and others for the purpose.

A list of the materials proposed includes every known substance which is repugnant to humans. If barnacles only had our tastes, there is no doubt that the problem would have been solved long ago. However, the more offensive to humans a substance is the more attractive it seems to barnacles. One experimenter went so far as to use a synthetic mircaptan, which is like the concentrated essence of the odor of the skunk. The barnacles seemed to relish its flavor.

One of the present writers has made a search among the patents relative to anti-fouling compositions. Several hundred patents were found, and they covered practically everything available in the way of toxic or supposedly toxic material. That the inventors were not always men of science but were working along haphazard lines would be indicated by the fact that the most ridiculous types of materials were included in the patent specification. One of these, evidently taken out by an Italian fruit merchant or restaurant keeper, covered the use of onion or garlic juice. Another one suggested the possibility of tobacco juice.

For many years the Navy Department has been interested in the question of preventing the fouling of ships' bottoms and made extensive investigations to determine the most effective materials to use in the paints applied to the bottoms of naval vessels. About five years ago it was concluded that, in order to solve the problem finally and definitely, a complete scientific study of the whole question was needed. The interest



TESTING THE APPETITES OF MARINE GROWTHS

Four test panels, differently treated, submerged on the west coast. Note the great growth of mussels on one panel.

of the Chemical Warfare Service of the Army was also engaged, as their scientists made exhaustive study of poison materials and should know how to poison everything, from hostile soldier to rat.

In the course of this work, which has been under the direction of one of the writers, several thousand large steel panels have been coated with various compositions and exposed below the surface of the water with wires attached.

Even at low tide the panels are sufficiently below the surface to be covered permanently by the salt water. At stated intervals inspectors go out in rowboats, pull out the panels and make a careful inspection, recording the conditions from the standpoint of corrosion, as well as fouling.

One of the most curious ideas that prevailed about fouling is that barnacles cannot attach themselves to a very smooth surface, such as glass. This notion was so firmly fixed that one experimenter proposed to glaze the bottom of a ship.

The fact is, however, that barnacles attach themselves quite as readily to glass as to any other surface. This has been demonstrated by submerging plates of glass in water infested with barnacles. They immediately took advantage of the opportunity, and when the rack was pulled up it was found covered with happy homesteaders.

Incidentally this work has established to our satisfaction one thing that will be of interest to the general reader. Almost everyone who owns a small boat has been told that greater speed is obtainable by keeping the bottom of the boat slick and soap-like through the application of grease, vaseline, graphite or similar materials. It has been proved, however, by a series of tests conducted in a model basin, that the resistance to propulsion through the use of such coatings is greater than when anti-fouling paints are used.

An interesting development in the anti-fouling experiments was the possibility of discouraging barnacles through the use of paints of light color rather than those of a dark hue. The suggestion for such tests came from the director of the aquarium at Bermuda, who kept specimens of fish in bait boxes in the harbor. It was observed that after the boxes had been in the water for long periods, those painted white or very light green were substantially free from fouling, whereas those painted dark were encrusted with growths.

Working upon this hypothesis, a series of tests was made at Beaufort with highly glazed porcelain panels produced in various colors from white to black. These were exposed below the surface of the water. At a slightly later date a series of electric light bulbs, stained in various colors, were also illuminated and exposed below the surface of the water. The results of these experiments indicated that, as a rule, while there seemed to be some preference of the barnacles to attach themselves to the darker colors, there were no very pronounced results upon which to generalize.

Thus, while many interesting results have been obtained from these studies of the methods of making warfare against minute organisms, perhaps our chief obstacle has been the rapidity with which the species multiply. Human intelligence is on our side, but the enemy are in trillions.

Much, however, has accrued to the credit side of the ledger. It has been established, for instance, that in place of the very expensive shellac that has been brought from India to be used as a base for these paints, American-produced rosin and coal tar, two very cheap substances, actually made a composition that is fully equal to the shellac. It has also been found that mixtures of copper oxide and mercury oxide, when added to this rosin-coal tar composition and pigmented with zinc and other pigments to give body to the paint, form toxic products that are of great efficiency. The speed of drying obtained through the use of these coatings is such that two coats may be placed upon a vessel in dry dock, in a period of about six hours and the ship placed back in the water with satisfactory results.

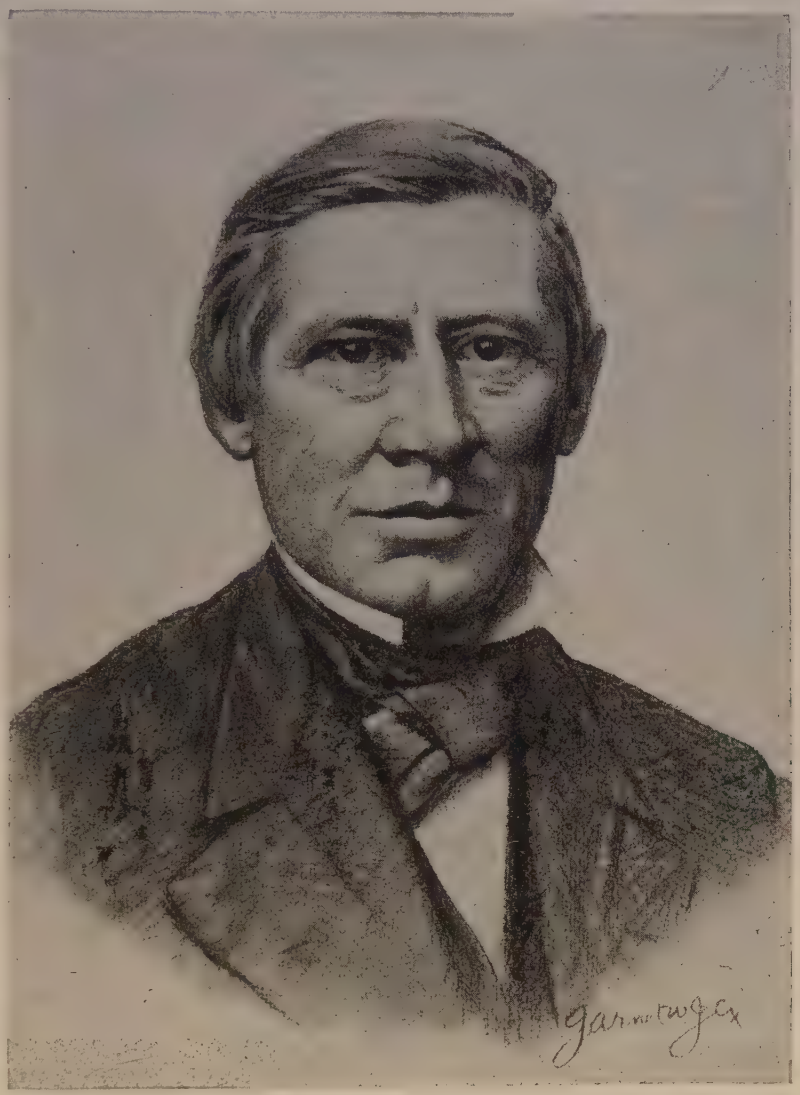
And so the work goes on, resulting in experiments that may save millions of dollars during the next few years. Meanwhile the baffling barnacle, encased in his rose-bud shell or plain mussel-shell, and his grassy cousins and wormy relatives will continue to pester humanity. Until the problem is finally solved, they will cause us to lose huge sums annually and provide work for the primitive scraping knives, which, in this highly scientific age, are still in use.

Asa Gray—Botanist and Educator

By Donald C. Peattie

BY A FIRESIDE in an old-fashioned farmhouse in New York State, in the winter of 1828, a young boy sat crouched, reading by its flickering flame what would seem like the dullest book in the world, a manual of botany. This boy was Asa Gray, who was to grow up into the greatest of native American botanists. At the time that we behold him thus engaged, however, he knew nothing of the subject. He was merely a boy with a thirst for science who had seen its first finger-post. Of course, there were no flowers to study then in the dead of winter, so the boy, longing and waiting for spring, read the volume through, and anybody knows that a manual of botany, however interesting when you use it, is no more entertaining as a printed page than a telephone directory.

But it was not dull to this boy, and when spring came at last he hurried eagerly out to the fields and found the first flower that bloomed and tracked it down in Eaton's "Manual." The flower was the spring-beauty, *Claytonia caroliniana,* named for John Clayton, earliest of our botanists. Spring-beauty then will forever mean something more than the return of the lovely season; it is linked in our minds with the great names of Clayton and Gray.



FROM A PHOTOGRAPH TAKEN IN 1867

ASA GRAY, 1810-1888

"Letters of Asa Gray," by Jane Loring Gray

But in Gray's boyhood there was little opportunity for him to follow his inclinations toward botany. He was poor and had to work very hard, and besides this he was planning to fit himself for a medical career. Boyhood and early manhood slipped away in this pursuit, but as he drove about the roads, an earnest country doctor, he used to collect plants and make specimens of them, and very bad specimens they were, as he admits.

A business trip to New York City offered the chance of seeing Dr. Torrey, at that time the leader of American botanists, and Gray called at his house, but found him away for the summer. He left a bundle of plants for Torrey to name for him and presently he received a letter in answer to it, and so began a long friendship between the two scientists.

Encouraged by this contact, Gray devoted himself passionately to the study of botany, mastering what was then known of it, and even preparing a little textbook on the subject. He had now resolved to become a botanist, and this was in those days a bold resolution for a poor man. Botany was not then recognized as a thing of any importance at all. It was generally skimmed over in a few lectures in the colleges, in a general course in science that would include geology, physics, chemistry, zoology, and perhaps even meteorology. There was probably not a paid specialist in botany in the whole country; even Dr. Torrey was obliged to teach several other sciences. The only people who could give their whole time to botany were a few rich and well-educated individuals in some of the centers of culture like Philadelphia and Charleston, men who had private libraries and private herbaria and exchanged information with each other and Europeans in long letters. Clergymen and physicians sometimes took up botany as a relaxing hobby, and it was considered a discrete pastime for well-bred young ladies. Plainly the science was rotting in the doldrums when young Asa Gray came to it, full of enthusiasm, bent on getting a position as a botanist when no such position existed.

He did soon succeed in finding a teaching position in Utica where he could sandwich in a little botany with the chemistry, geology, and mineralogy he was obliged to teach to young boys. Next year he met Dr. Torrey, and together they explored the still mysterious pine barrens of New Jersey.

Dr. Torrey, who needed an assistant, endeavored to create such a position for Gray, but the New York City Uni-

versity could not find it in its heart to pay even a very small sum to a botanist, so that hope was dashed. Undaunted, Gray kept on trying, while Torrey took him into his home. At last the chance came when he was made a professor of botany in the University of Michigan, at a salary of fifteen hundred dollars a year. The university had no buildings and was indeed largely a plan on paper, and actually Gray never saw the spot because he asked and obtained leave of absence to go to Europe and study in the botanical collections there. This he did upon agreement to buy books for the new university's library, and so he got to Europe, met everybody of any importance, and collected plants in the Alps, his first taste of anything stranger in the way of flowers than the flora of New Jersey and New York. When he returned he applied for another year's leave from Michigan and obtained it. This time he was bent upon collaborating with Torrey on a "Flora of North America."

It requires a little explanation in these days to understand why such a work was necessary, or to understand, in fact, what Gray's great enthusiasm for describing and naming plants was—an occupation that would seem not only dull to some people but scarcely a science. It must be remembered that in Asa Gray's time practically nothing was known about some of the most important sides of modern botany such as the physiology of plant growth, the structure of the cell nucleus, experimental study of plant diseases, evolution, genetics, and many other subjects. On the other hand the varied vegetation of our country was still new, at least west of the Appalachians; strange new flowers were constantly being sent back by explorers of the opening west. Classification of our country's flora was not only necessary before any other branch of the science could proceed far, it was a very exciting and alluring task.

And so Gray and Torrey began their synopsis of the flora of our continent, a task that they knew would never be complete but would at least break trail for future students in the jumble and the jungle of hitherto unsorted information.

Yet it is not as a systematic botanist so much that Gray is known to posterity, but as an educator. His students included many of the greatest botanists of the next generation, and throughout his life he was an inspiring teacher. His little shelf of textbooks on botany has been described as "the finest set of textbooks ever issued in the English language." So clearly, so charmingly did he write of plants, how they grow, how they reproduce, how they are constructed, how adapted they are to their life conditions, that he delighted successive generations of young students all over the country.

The name of Asa Gray is forever associated with Harvard University and the old botanical garden in Cambridge. There for nearly two score years he worked and sent forth his students. He established the country's botanical capital, respected in Europe as well as here. Gray had become the recognized leader of American botany, and when he took up the defense of Darwin in this country his popularity was so great, and people believed so thoroughly in his clear logic, that he won more converts than fiery eloquence could have done. "You never touch the subject without making it clearer," said Darwin to Gray, and, "I look at it as even more extraordinary that you never say a word or use an epithet which does not fully express my meaning."

But Gray's work was not confined to the historic spot on the corner of Garden and Linnaean Streets, Cambridge. Repeatedly we find him in the mountains of North Carolina, a favorite hunting ground, or on the alpine slopes of the Rocky Mountains. Now he is writing to Darwin, suggesting to him a little idea on the motions of plants which Darwin worked up into a book; now he is vigorously denouncing Rafinesque whose theories he could not abide. As his word gained weight he came to be a severe critic of other men's work, but his comments were meant, at heart, to keep American botany conservative and up to a high standard.

We see Asa Gray last of all as a handsome old man, white-bearded, sparkling of eye, still vivacious in his movements, even delighting in boyish pranks. He was a lover of living plants as well as dead specimens, and in his latter years opportunities to travel widely in the field came to him; those delightful doors that had been denied him in the poverty and obscurity of his early career were opened.

Asa Gray's life was in no way adventurous or romantic like that of Michaux or Rafinesque or Nuttall, but resembled that of Darwin and Linnaeus, men whose fortune it was not to travel very widely. But like those greater men, by sheer dint of his worth, which nobody could fail to recognize, he carved out for himself a high place, and, besides, raised American botany to the dignity of a science.

The Mud-skipper

By Edward A. Preble

PHOTOGRAPH INTERNATIONAL

FISH OF AN ANCIENT LINEAGE

This strange inhabitant of the waters is a curious and inquisitive fellow and named accordingly.

THIS strange fish belongs to a very ancient family and is otherwise remarkable in many ways. Its name is *Periophthalmus,* which comes from two Greek words meaning "looking around," in allusion to a peculiar habit. It is partial to mud flats, where it sits around on stones or protruding roots, entirely out of water, supporting itself by means of the two strong pectoral fins, which are used as arms. In this position the fishes appear like large tadpoles, but are more interested in their surroundings. They watch everything that goes on about them, their prominent eyes, which are capable of protrusion, giving them an advantage over most creatures. At the slightest alarm, they skip for shelter, sometimes to the water but just as likely landward, where they often climb the projecting roots of trees, or even the stems of bushes or other plants. In all their movements they are assisted mainly by the pectorals, which are furnished with strong muscles, and by the aid of which they can grasp the stem of a bush as a boy or a bear hugs a tree trunk when climbing. They are found mainly about the shores of the Indian Ocean.

Some Interesting Things to See in November

By E. Laurence Palmer

NOVEMBER is, of course, a month of thanksgiving. Certainly any month with a reputation of that sort must have interesting things for those who are Nature-minded. In the old days, in the northeastern part of the United States, men used to go out and shoot a few wild turkeys for Thanksgiving dinner. Now they are fortunate if they don't get shot themselves since there are many, many more hunters afield than there are turkeys. The absence of many of our most splendid species of game from the fields at present has done much to make people wonder whether or not there will be anything left for our grandchildren to see. Fortunately, the public is coming to appreciate more and more that a wild bird or mammal is just as much the property of a Boy Scout or Campfire Girl or other Nature lover who desires to photograph it, as it is the property of someone who desires to shoot it. The fact that the photographers are probably as numerous as, if not more numerous than the killers bids fair to make November of the future a bit more entitled to be thought of as months of thanksgiving than of thoughtless slaughter. The whole problem of the shooting of game, of course, involves rather complicated viewpoints. Where game is abundant and covers are becoming overstocked it may be a kindness to reduce the numbers, but the real danger at present probably does not lie in that direction. It will pay Nature students to try to think this matter through as sanely as their experience permits. In doing this, one will be concerned with but one of the many phases of Nature which demand thorough analysis before the passing of final judgment.

WILD TURKEY

During November not a few people make the practice of burning over their fields of stubble. Swamp lands, too, are not infrequently burned over after the plants have been killed by the frosts. It might be well for those of you who have the opportunity to examine some bit of burned-over land rather critically and note among other things how deeply into the sod or leaf mould the fire burned. What seemed to be the effect of the fire upon the seedlings of woody plants in the woodland burned over? Was there a tendency for the fire to burn for a longer or for a shorter time around the roots of the smaller trees? Were there any species of trees whose bark seemed particularly susceptible to the attacks of the fire and any that seemed particularly resistant to its attack? Make an insect study of a square rod of ground in the burned area and a similar study in the unburned adjacent area, and determine, if possible, whether the fire was an asset or a liability. If you are trying to raise trees or crops dependent upon vegetable mould, it is hardly profitable to set fires for the purpose of destroying insects if you also destroy more valuable materials which help your crops.

MOURNING CLOAK BUTTERFLY

In addition to studying the fire area for its effect upon the plants of the area, study it from the standpoint of its effect upon the food of game birds and other birds which may normally make their homes there. If the fire interferes with the prosperity of the birds, it may also interfere with the prosperity of the crops which those birds might protect. You might also like to make a study of the birds present in a burned and in an unburned area as well as a study of the food of these birds.

While looking at a burned-over area you may note that many insects saved themselves by "digging in." They may have done this deliberately for the purpose of escaping the fire or they already may have dug in for the purpose of avoiding the cold of winter. Do these insects or other small forms of life that you find deep underground have any specialized parts of their bodies which permit them to dig in? The means by which such creatures as the nymphs of cicadas work their way through hard ground differs radically from the means by which earthworms do the same thing. I might tell you about some of the methods followed but I don't wish to deprive you of the pleasure of puzzling over the matter yourself. You might enjoy digging in the garden early in November and late in November to see if it is necessary to dig deeper late in the month for earthworms than it is to dig early in the month. How about it? In this way you, too, can "dig in."

If you enjoy a game of hide and seek, you might imagine that various insects are calling "Coop" to you from almost every tree and then you may go to see if you can find them. Some will be hidden under the bark, some in the wood, some in old leaf-clusters and others elsewhere. If you wish, you may add to this list and see how many different places you may find them, and whether or not you find

BLUEJAY AT LUNCH

RED-SHOULDERED HAWK

certain kinds of insects in different types of places or if most insects of a kind hide in similar places and use similar means of concealing themselves. Remember that many of your winter bird friends are to depend upon their success in playing this game and, if they lose, they must go hungry to bed. To assist them in this difficulty and make it possible for them to enjoy Thanksgiving it might be well for you to start your winter bird feeding station some time in November. What were the first birds that came to your station, and, if you are a bird bander, when in the month did you first get a return from a last year's bird?

Speaking of birds going to bed hungry reminds me of a city girl who asked me where birds slept when they had no fences to perch upon. To this girl a fence was a necessity for a bird desiring to retire. This brings up the question as to how birds do spend the night. Keep your eyes open and determine, if possible, where and in what position such birds as chickadees, woodpeckers, English sparrows, pheasants and others spend the night. Does a woodpecker, for example, go to sleep perched on the tree trunk or does it get on top of a limb? Do any of these birds sleep on fences, as was the belief of the girl who was responsible for the inclusion of this observation in this list?

THE MINK

While you are watching these birds going to bed, you may notice that they do this somewhat earlier in the day than they did in July. In this connection, watch where the sun sets and determine if it sets farther to the south or farther to the north each succeeding night in November, or if it varies the order during the month. Make your observation each afternoon from the same place, of course. I use the place where the sunlight strikes the wall through one of my dining room windows for the purpose. Each night you will find a slight variation, but I will leave it to you to determine the direction of the variation. In addition to noticing the distance north and south of the setting sun, you might also like to "keep tabs" on the variation in the time of setting.

Most of you may consider November a rather poor time to hunt moths and butterflies, but I know that if you set out to do it you may find them clear through the month. When, for example, do you find the last, white, cabbage butterfly or the last, dark, mourning cloak butterfly? You may also find that the fall months produce crops of fall cankerworms whose female moths may be found climbing up the trunks of trees where they mate with the winged males and later lay eggs for next year's crop of cankerworms.

November is a month in which we hold elections as well as Thanksgiving dinners, and we might let the election idea carry over to our Nature observations if we desire. A mink might win the office of mayor of Trout Brook by running on a wet plank while a red-shouldered hawk might win the highest office in the dry territory. This comparison might easily lead to the thought as to whether a majority of our country was

THE SKUNK PROWLS

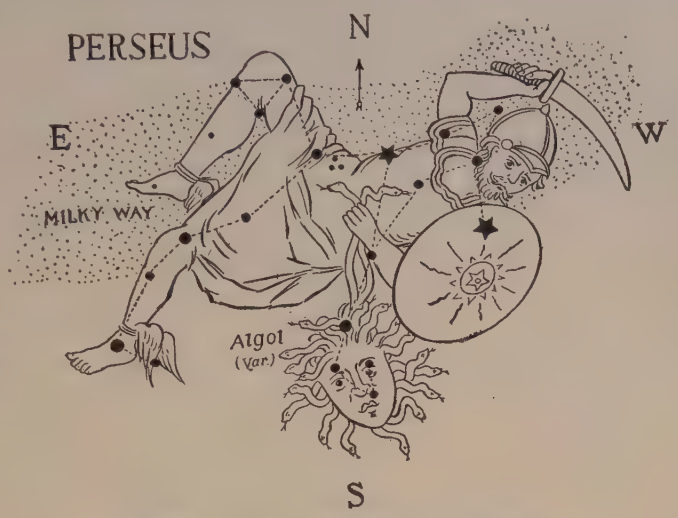
open drier land or trout brook, but we will not take up the issue here. Suffice it to say that in almost any type of land, whether it be meadow, rocky hillside or swamp, there are some forms of life which in a way consider themselves entitled to be in a position of power. Certainly, a mouse would hesitate to dispute the supremacy of a trout brook with a mink. For your own satisfaction, it might be well during this election month to attempt to determine by argument with your friends, by direct observation on your own part, or by consulting of authorities on the matter, what are the ruling forms of life during November in a given bit of woodland or swamp land near your home. Of course, man is essentially the ruler in settled lands, but even man hesitates to dispute the supremacy of an open field on a dark night with a skunk. Without firearms, man might retire gracefully or otherwise from the contests with other forms of life. This may cause you to wish to investigate the various means by which various animals attain their supremacy, though the investigation may stir up quite a smell in the case of the skunk, as it does in the case of many political investigations that have been conducted. You may need something more tangible than a protective tariff in case you intend to contest ownership of a woodchuck hole with a skunk. Such a contest may result in the encouragement of considerable home industry, at least so far as clothes cleaning is concerned. For the fun of it, ask your friends just what are the opening exercises when a skunk decides to declare war. If you don't know, here is something for you to find out about in November. It may be done with greater safety possibly in November than later in the year, because young skunks are often rather unsophisticated and don't always seem to know what is the proper thing to do in an emergency. Do skunks spread their scent by spraying it onto their tails and then shaking it off like one shaking water off a broom, as a certain Nature book with wide adoption states is the case?

So November, month of Thanksgiving and elections, holds many things that are very interesting to see and study, and it also ushers in the winter with still more interesting things.

Perseus and the November Skies

By Isabel M. Lewis

PERSEUS, son of Jupiter and Danaë, and the rescuer of Andromeda from the sea-monster, Cetus, is one of the most famous heroes of mythology. One of his earliest exploits was the slaying of Medusa, the snaky-locked Gorgon. This he accomplished with the aid of Pluto's helmet of invisibility, the shield of Minerva and the winged shoes of Mercury with which he is pictured here. Protruding from beneath his shield there also is seen the head of Medusa, which he severed from her body and carried with him on his future adventures. Atlas, the giant, who refused to see Perseus, fearing to be robbed of his golden apples in the garden of the Hesperides, was later turned to stone when Perseus held the head of Medusa before him. Fable has it that the giant still stands there bearing the weight of the earth upon his shoulders.



TRAIN YOUR TELESCOPES ON PERSEUS

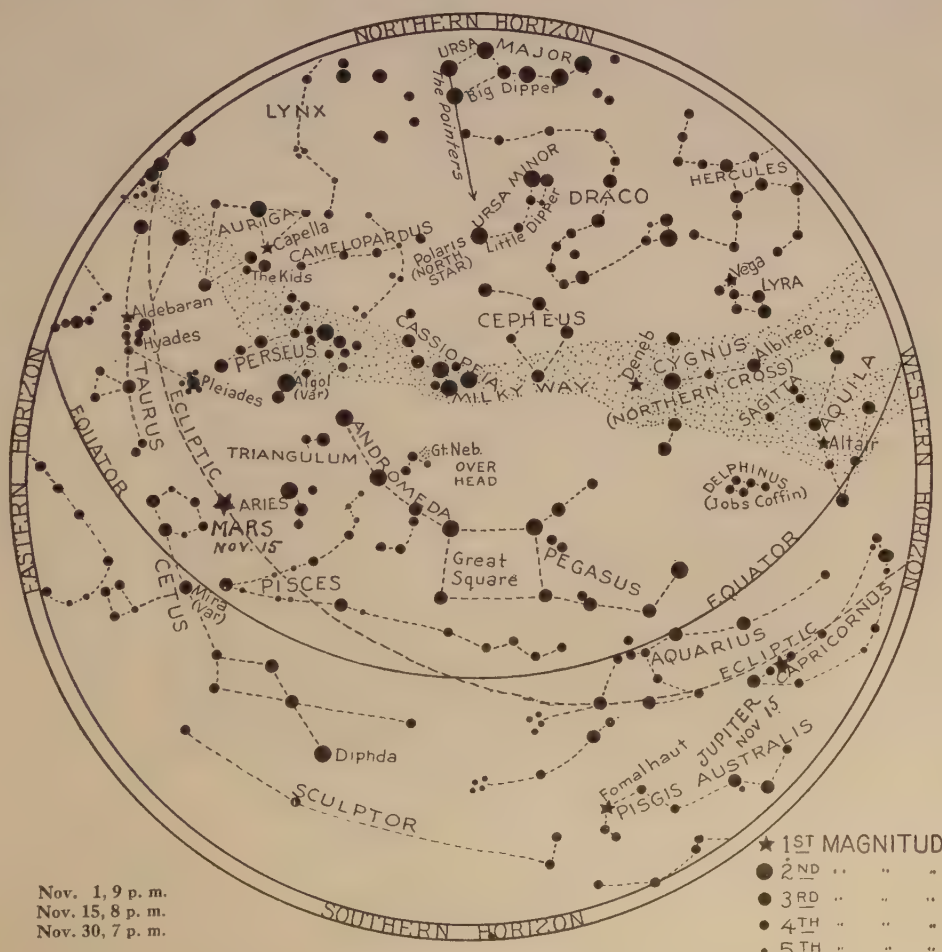
This planet lies in an interesting field of stars in the Milky Way and is well worth study.

Algol, or Beta Persei, the noted variable star that drops within the space of a few hours every third day from a second magnitude star to one of the third magnitude, was called the Demon Star and is supposed to represent the wicked, red eye of Medusa. With a few faint stars nearby it forms "Medusa's Head." So regularly does Algol vary in brightness that its light changes can be predicted to the minute far in advance. Its loss of light is caused by a large but faint companion star close to Algol that is revolving around it in a period of a little less than three days. In one part of its orbit this star passes directly between us and the brighter star and eclipses it, just as the moon eclipses the sun when it passes directly between us and the sun.

Perseus lies in a very rich and interesting field of stars in the Milky Way. It would be well worth while to examine this field with a field glass or a small telescope, while keeping a lookout also for the periodic decrease in the light of the Demon Star, Algol. The brightest star in Perseus is Alpha Persei, a star of the second magnitude, that lies east of and nearly in line with the three bright stars in Andromeda. The most westerly of these three stars in Andromeda lies in the northeast corner of the Great Square in Pegasus. From this point the line connecting them extends eastward toward Perseus.

In Perseus there is a long curved line of bright stars that extends from the hero's left foot to his uplifted right arm which holds the sword. This conspicuous line of stars is known as the "segment in Perseus." Running nearly at right angles with it is another line of stars connecting Alpha Persei, the brightest star, with Algol and the stars south of it. This line forms a very good L with the upper part of the segment, and will also be helpful in identifying this constellation.

Perseus also may be easily located by the fact that it lies in the path of the Milky Way directly to the southeast of the W in Cassiopeia and west of



Nov. 1, 9 p. m.
Nov. 15, 8 p. m.
Nov. 30, 7 p. m.

TO USE HOLD OVER THE HEAD WITH TOP TOWARD THE NORTH

the brilliant, first magnitude star Capella in Auriga.

Two astronomical events of special interest this month will be the appearance of the two showers of meteors, the Leonids and the Andromedes, which appear every year in November, and the opposition of planet Mars to the sun, which will occur on November 4. All who are interested in the ruddy planet Mars should make the most of the opportunity to train their glasses on it this month. It will be fifteen years before it will again be as near to the earth as it is now. Mars was nearest to the earth on October 27 when its distance was 42,625,000 miles. At the time of opposition on November 4, when sun, earth and Mars will be in line, with the earth between the sun and Mars, the planet will rise at sunset, be on the meridian at midnight and set at sunrise. Its distance from the earth then will be 43,117,000 miles. During the last week of October and the first two weeks in November, Mars and Jupiter will be almost exactly equal in brightness and over 30 per cent brighter than Sirius, the brightest of all the stars.

On November 15 the distance of Mars from the earth will have decreased to about 45,500,000 miles, and by November 30 Mars will have receded to a distance of 51,818,000 miles. By that time it will show a noticeable drop in brightness, while Jupiter will continue to be practically unchanged in brightness throughout the month. These two planets will be by far the most conspicuous objects in the evening sky in November, Jupiter in the western sky, in Capricornus, and Mars in the eastern sky, in Aries. On November 11 Jupiter will be due south at sunset. No one should miss an opportunity to observe these two fine planets through the telescope this month. Jupiter is always a most interesting planet to observe because of the various phenomena presented by its satellites and its ever-varied belts and coloring and Mars because of its snow caps, changing color with the seasons, and the possibility that life exists upon its surface which always make it a fascinating object.

As regards the other bright planets this month, Mercury is not in a favorable position for observation, and Saturn and Venus both come into conjunction with the sun and with each other on November 21 and will be invisible. Venus, because of its superior brightness, may be seen low in the eastern sky before sunrise early in the month. Its next appearance will be as an evening star late in December.

Those who are interested in watching for the November meteors will find the Leonids radiating from the direction of the Sickle in Leo about the fifteenth of the month. To observe them one must be up several hours before sunrise when Leo will be found high in the eastern sky. As the earth meets this swarm "head on" its individual members are very rapid in their motion and in color are bluish-white or green.

The Andromedes come from the direction of the constellation of Andromeda, so will be seen in the early evening hours. In contrast to the Leonides they are very sluggish in their motions and are reddish in color. Their greatest display will occur between November 20 and 25.

A Short Twilight

By R. Bruce Horsfall

ONE EVENING in early October, a flock of chimney swifts, on their southern migration, were weaving intricate patterns across the glow of the setting sun. Swifts migrate during the day and choose some large unused chimney to sleep in at night—always the same one is used year after year and, when the flock is composed of thousands of birds, the effect is quite as if the chimney were reswallowing its own smoke.

THE CAPITOL DOME SHONE OUT CLEAR

The sight is always an interesting one, and I waited to see which chimney in this great city of Washington the swifts had selected for their stopping place. But, as I watched, the birds dwindled to less than a dozen without my seeing where they had gone. Where? I asked myself as I turned about and searched the fast-dimming horizon. The western sky was still aglow with color, while over the city below the hill, night seemed already to have settled. Completing the round of inspection, I was baffled, for the few remaining swifts had also disappeared into the gloom below. Circling about overhead was a lone bat. A lone bat? No—there were a dozen bats winging their erratic courses where but a moment before hundreds of birds had been. It was an instantaneous change startling in its abruptness. A few minutes later and even the bats could not be seen in the deep shades of a moonless night. Only a few twinkling lights gleamed through the trees of the city streets while the capitol dome, like Mt. Hood in all her snowy purity, shone out clear in the play of the beams that threw their electric daylight.

NATURE EDUCATION

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Prof. L. D. Wooster, Kansas State Teachers College, Hays, Kansas.

Miss Clelia Paroni, Supervisor of Nature Study, Berkeley, Calif.

Dr. Bertha Chapman Cady, Girl Scouts of America.

Nature Study at the Sesqui

Nature Study is represented in the Palace of Education at the Philadelphia Sesquicentennial by an exhibit of posters, circulars and color plates of flowers in the attractive rustic booth of the Wild Flower Preservation Society. Transparencies of rare flowers, and an automatic lantern showing flower slides with names and legends, add interest. One of the end walls is entirely devoted to an exhibit of color plates, outlines, bulletins, and other publications of the American Nature Association. Literature from several state chapters of the Wild Flower Preservation Society and the California Save-the-Redwoods League covers the remaining walls of the booth. Some flower outline drawings colored by sixth-grade school children of the District of Columbia are also shown. Among the throngs who have visited the exhibit have been several hundred school teachers. Free literature has been distributed and much oral assistance given by an attendant.

Across the aisle from the wild flower booth is an attractive display of colored wax models of flowers, birds, and animals, in small portable cases with colored photographs of the natural habitat as backgrounds. These models, made up by the Chicago Field Museum of Natural History under the Harris Fund, are sent out by the Museum to the public schools of Chicago to aid in Nature lessons.

Forestry is represented in the Government and Transportation Building by the unique and beautiful exhibit of the U. S. Forest Service, prepared by Paul Fair and Wallace Hutchinson of the Public Relations branch of the California office. Other forestry exhibits appear in the Palace of Education and the Pennsylvania Building. The National Education Association exhibit shows a set of the colored post cards of flowers issued by the Wild Flower Preservation Society. Original outline and colored sketches of flowers, birds, and animals done by the lower-grade pupils appear in the exhibit of the Philadelphia public schools.

WHO'S WHO IN NATURE STUDY

O. J. Kern

Liberty Hyde Bailey once said in effect, "Blessed is the man who has an incomplete course." This beatitude gave courage to O. J. Kern, whose failing sight curtailed his university training. The University of California press said of him three years ago: "Prof. Kern has just completed ten years of service in the University of California, begun after passing the half-century mark, and has come nearer to doubling the talents put in trust with him than many whose names are followed by masters' and doctors' degrees."

As a boy on the farm he loved natural beauty, and, when elected County Superintendent of Schools in 1898, he introduced Nature Study and improvement of home and school grounds into the rural school curriculum. This endeavor to vitalize rural education Prof. Kern looks back upon as the best educational training of his life.

At present he is engaged in teaching and investigation in the field of rural education, a great part of his work being as Assistant Professor in the Extension Service of the College of Agriculture of the University of California. Besides the students from all parts of the world in his classes, he has lectured to 252,093 persons on Agriculture, Nature Study, Home and School Gardening, and kindred subjects. For twenty-five years, he has made a special study of what is significant as lantern slide material. Through this medium he has taught the alphabet of landscape beauty. There have been distributed 40,000 copies of Prof. Kern's circulars and bulletins—one on School and Home Gardening, and two outlining the Course of Instruction in Agricultural Nature Study for the Rural Schools of California.

* * *

Field Excursions

Because of the climate, field excursions can be, and are, taken almost every day of the school year by Nature classes of the Los Angeles public schools. A city-wide Nature Study excursion to the seaside at Point Fermin during November and one up Mt. Wilson in May, each includes from fifteen hundred to three thousand pupils made up of selected parties of about twenty pupils to a teacher. These excursions are most interesting and inspiring. Not every section can boast the California climate, but in spite of weather and other difficulties a way is to be found for taking field excursions wherever there is the will to do it. Well conducted, the field trip is the Nature lesson par excellence.

* * *

Nature Guide Report

If there be any who question the value of teaching Nature Study in the National Parks, a report of the Nature Guide program in California State Redwood Park during the summer of 1926 should put an end to their doubts.

* * *

California Botanical Garden

A Botanical Garden, similar to the famous Kew Gardens of London, is soon to be started in Southern California. It will be located near Santa Monica and financed by a number of millionaires.

NATURE IN PRINT

Nature Guiding

In the introduction to *Nature Guiding* Prof. William G. Vinal gives the following definition: "Nature guiding is the science of inoculating nature enthusiasm, nature principles, and incidentally nature facts into the spirit of individuals." Measured by this yardstick Prof. Vinal is a true Nature scientist, as he has a positive genius for inoculating with Nature enthusiasm those with whom he comes in contact, and much of this enthusiasm breathes from the pages of his book.

The growth of the Nature Study movement and its introduction everywhere, in summer camps, in scout and camp-fire organizations, the public schools, playgrounds and the home, has created a demand for Nature leaders, and in presenting this book to the public Prof. Vinal has met a great and increasing demand with a unique work, the purpose of which, as stated, is to supply a book of methods for Nature Leaders. Within the limitations of this column it is impossible to do justice to this book or its author, or to even give a brief summary of its contents or its scope. Suffice to say that teachers, councilors, or others engaged in directing Nature work in any of its phases cannot afford to be without *Nature Guiding*, which represents the results of long years of study by a scientist of high attainments and actual experience in Nature Study leading.

Nature Guiding is published by the Comstock Publishing Co., Ithaca, N. Y., price $3.50.

Department of Agriculture Yearbook

The fifth and last of a series of Yearbooks of the Department of Agriculture is now being distributed. This series, which deals primarily with the economic aspects of agriculture, has covered in a comprehensive manner livestock, grains, dairy products, tobacco, forestry, forage resources, fibers, land utilization, and land tenure, highways, credit, taxation, the poultry industry, and weather forecasting. The present volume discusses the fruit and vegetable industry, and contains the Secretary's annual report to the President. Half of the volume is devoted to agricultural statistics. Secretary Jardine states that the economic studies contained in this series of Yearbooks were intended to assist farmers in coping with the problems and difficulties of the past five years, crop readjustment and overstocked and demoralized markets, the disparities between the prices of things they have to sell and the things they have to buy. The present volume covers cultural methods, marketing problems, plant pests and diseases and methods of combating them, utilization of surpluses and by-products of fruits and vegetables. If you cannot obtain a copy through your congressman or senator, through whom 400,000 copies are being distributed, you can purchase the Yearbook from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Snails and Slugs

Students of the science of Malacology or Conchology will welcome "British Snails, a Guide to the Non-Marine Gastropoda of Great Britain and Ireland, Pliocene to Recent," the work of an English author, Arthur Erskine Ellis, most excellently illustrated by the author's father, R. A. Ellis, and brought out by the Oxford University Press, American Branch, New York. This volume will fill a long-felt want for a handy work of reference giving in convenient form descriptions and figures of all the British non-marine Gastropoda. This book should be of distinct value to collectors and field-naturalists, and well worth its price of $3.50.

The Winter Trees

From the press of the Macmillan Company, New York, comes a reprinted edition of "Trees in Winter," by Albert Francis Blakeslee, Ph.D., Professor of Botany and Director of Summer School, Connecticut Agricultural College, and Chester Deacon Jarvis, Ph.D., Horticulturist, Storrs Experiment Station. This manual describes the trees by their dormant characteristics during that period when the tree is in a resting condition, from the shedding of leaves in the fall to the bursting of buds in the spring. It covers such subjects as propagation of trees, selection of trees for special purposes, the care of trees, common injuries to shade trees, the control of parasites, etc., more than half of its four hundred and forty-six pages being devoted to the identification of trees. Written in an entertaining manner and profusely illustrated, this book will be a valuable addition to the library of those interested in the study, care, and identification of trees. The price is $2.50.

Story of the Range

Reprinted from Part Six of the hearings before a sub-committee of the Committee on Public Lands and Surveys of the United States Senate, Sixty-ninth Congress, First Session, comes "The Story of the Range," by W. C. Barnes, Assistant Forester and Chief of Grazing, Forest Service, Department of Agriculture. Perhaps no other man in the United States could handle this theme with the comprehensive knowledge which Mr. Barnes brings to the subject. Serving as private and sergeant in the Signal Corps, U. S. A., from 1879 to 1882, Mr. Barnes was awarded the Congressional Medal of Honor "for bravery in action with hostile Apache Indians" at Ft. Apache, Arizona, in 1880. A former member of the Arizona and New Mexico State legislatures, Mr. Barnes has been with the Forest Service since 1907, and he brings to "The Story of the Range" a first-hand, exhaustive knowledge of cattle and grazing from colonial times to the present day. This publication of the U. S. Department of Agriculture may be obtained from the Superintendent of Documents, Washington, D. C., for 25 cents per copy.

An Old-Time Settler

"The Ailanthus Tree in Pennsylvania," written jointly by J. S. Illick and E. F. Brouse, and issued as Bulletin 38, by the Pennsylvania Department of Forests and Waters, Harrisburg, Pa., traces the history of this tree from the first tree immigrant who "settled" in 1784 near Philadelphia, to the present time when it has become necessary to control this "ultra-aggressive tree" or find a use for its wood. The suggestions given and conclusions reached will be helpful to all who are interested in the Ailanthus.

Of Interest to Nut Growers

The purpose of a new Department of Agriculture Bulletin, "Farmers' Bulletin No. 1501-F, Nut-Tree Propagation," as set forth by that department, is to provide growers with a working knowledge of how asexual propagation is effected. Nut trees, as is well known by the grower, do not reproduce themselves true to variety from seed. This pamphlet will increase his ability to improve his stock by top-working, that is by budding and grafting the inferior trees in his orchard to better varieties. This bulletin may be obtained upon request by writing to the United States Department of Agriculture, Washington, D. C.

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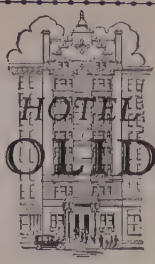

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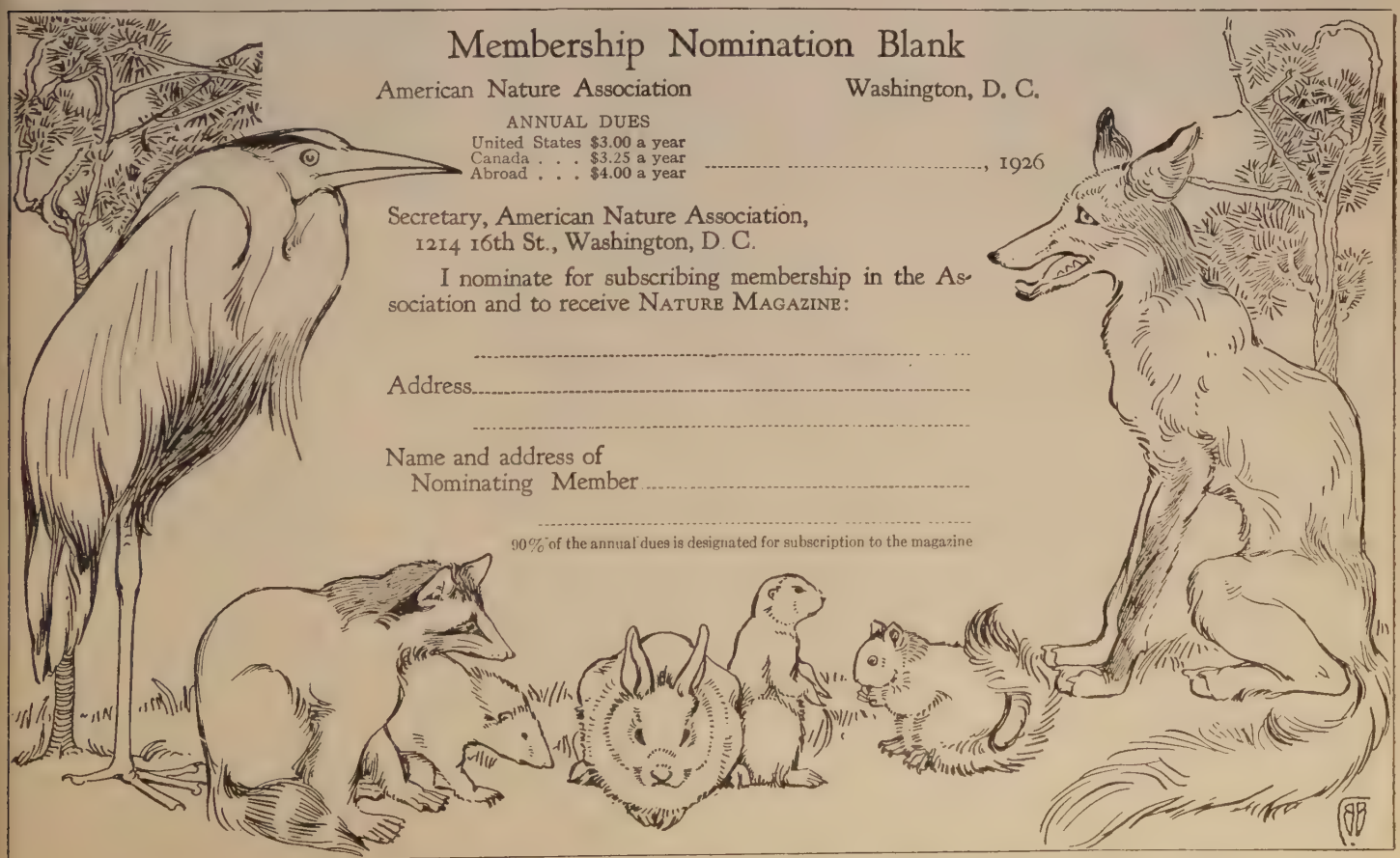

Playful Lightning

H. W. Getz of Moline, Illinois, sends in this interesting picture showing how the lightning made a ladder, perhaps so that the bolt could mount

by its rungs to the heavens, from which it descended in all its fury. The picture was taken on Knife Lake on the Minnesota-Ontario boundary. The Norway pine so split is about eighteen inches in diameter.

The Source of Greenheart

From the jungles of Western British Guiana comes the world's only supply of greenheart, one of the most valuable woods of the world for strength and durability, and fully comparable with the Asiatic teak. Other species yield wood equal to or surpassing American hickory, valuable in the manufacture of tools, and other wood whose grain and color make them suitable for the best furniture. The United States and Europe are depending more and more upon these jungles for their supply of hardwood, according to Dr. Gleason of the staff of the New York Botanical Garden, who states that dense forests cover some 77,000 square miles, or nearly ninety per cent of the area of the colony.

Peter Crossbill

By Josephine Copeland

Peter just insisted on getting in the bird trap. He would do so four and five times a day after his first visit, seeming to enjoy it. My sister, the late Ada B. Copeland, for many years held a bird-banding permit and came to be known throughout Colorado as a leader in ornithology, being able through her school work, to stimulate hundreds of boys and girls in the love of Nature. That is how we happened to have the bird trap.

From the very first visit to the trap, Peter, as he came to be known, seemed to have little fear of humans. After a half dozen visits, this Mexican crossbill would sit on a stool in the house and crack sunflower seeds with people moving about. Not long after he would perch on one's finger and take the seeds from one's hand. He was not a pet and we never confined him. He stayed with us companionably for many weeks, then one day departed on his way.

One of Nature's Pranks

Many are the strange pranks that we find Nature playing and they are always interesting and frequently re-

markable. Here we have pictured a strange natural graft of a tree growing on the farm of Henry Hunter near Chappaqua, New York. The photograph was sent in by George Hunter.

Mother Instinct

The Condor for September-October contains an interesting description by a writer in Yountville, California, of his observations of a robin one torrid day last July, when the thermometer registered over a hundred degrees in the shade. The bird came to a water pan placed under a dripping faucet. It took a few sips, then dipped its beak deep down in the water and flew swiftly and directly to its nest and birdlings in a nearby acacia tree. Repeatedly it made the trip and it was apparent that the mother bird was carrying cooling drinks to her fretful children, gasping with the heat in the boughs overhead.

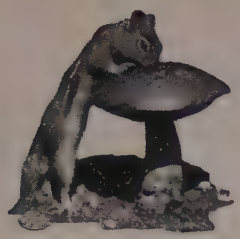

Photo by Guy Caldwell

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Worthy of emulation by her sister states, Georgia, through the State Board of Fish and Game, is seeking to develop the wild life resources of the state by establishing a large number of game refuges. The policy of establishing many small refuges rather than a few larger ones, has been adopted in order that the entire state may receive the benefit of increased wild life.

Closed Season for Plover

The Biological Survey of the Department of Agriculture has declared a continuous closed season on black-bellied and golden plover, and persons killing these birds are liable to prosecution. This does not apply to the yellowlegs, which may be hunted between certain dates. You may obtain information as to open date on these, and other kinds of game for your locality by writing the above bureau, at Washington, D. C.

Pacific Bird Havens

Johnston and Sand Islands, two small dots on the map about five hundred miles south of the Hawaiian Islands, have been set aside as reservations for the protection of native birds. Johnston Island has been the breeding ground of thousands of waterfowl of several species for a long time and in response to the recommendation of the Governor of Hawaii, an Executive Order of the Government has assured these birds a safe nesting place.

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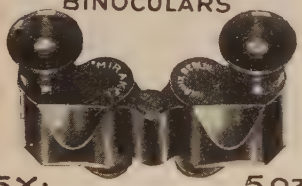

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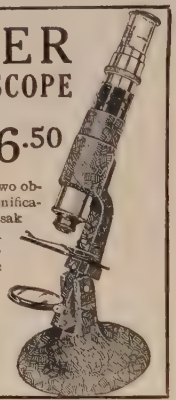

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Wisconsin Animal Haven

Beautiful "Wychwood" on Lake Geneva, with its seventy-two acres of woodland carpeted with rare flowers, has been presented by Mrs. Frances Kinsey Hutchinson to Wisconsin to be preserved as a wildflower sanctuary and a haven for birds and small animals. A trust fund was endowed with the gift and under the terms of same Mrs. Hutchinson will remain at Wychwood as director of the natural park. In addition, a board of three self-perpetuating trustees is made up of Dr. Henry Chandler Cowles of the Department of Botany, University of Chicago; Dr. Robert Ridgway, noted ornithologist; and Attorney Noble Brandon Judah, Mrs. Hutchinson's nephew. In donating the woodland to the state, Mrs. Hutchinson carried out the wishes of her husband, who was, until his death two years ago, president of the Corn Exchange National Bank and a leader in Chicago's cultural life. Mrs. Hutchinson is president of the Wild Flower Preservation Society of Illinois.

The Wily Trade Rat

The popular conception of a Forest Ranger, as a male being of huge proportions attired in rough-and-ready corduroy and boots, sometimes receives a rude jolt. The Grand Canyon National Park Nature Notes for September tells a good story about Assistant Chief Ranger Frank Winess, of the Bright Angel Ranger Station. It seems that Mr. Winess is a vocalist, accompanying his songs with the strains from his guitar. He is naturally very popular and in great demand at parties at the Wylie Way Summer Camp nearby. Making ready for such a festivity recently, Mr. Winess went successfully through the various details of his toilet until he was ready to don his *dress coat*, when, to his amazement, he discovered all the buttons were missing. Suspecting his roommate of a practical joke, his anger was not appeased until discovery was made that his roommate's buttons were also conspicuous by their absence. A bulging pocket invited exploration when the missing buttons as well as a lot of miscellaneous matter were discovered. Then the source of the trouble was apparent—a pack of trade rats. As the tale concludes with the statement that Mr. Winess stopped up the rat hole, sewed on the buttons and proceeded to the party, it would indicate that facility in rat catching and sewing are two of the necessary and multitudinous qualifications of a Forest Ranger.

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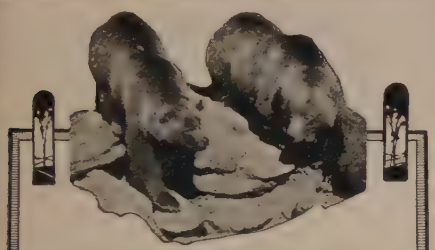

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Zoo Receives Lizards

Four thousand years ago, says the *New York Times*, the Chinese got the design for their flag, the hideous dragon, from mammoth reptiles then inhabiting Indo-China, and two of the descendants of this monster have just been added to the collection of strange beasts in the New York Zoological Park. The presence of this traditional dragon on the island of Komodo in the Southeast Indies was first reported by a Dutch engineer in 1912, and Alan Cobham, a British aviator, in flying over this island from London to Australia last July reported having seen the monster. Last December Douglas Burden of the American Museum of Natural History headed an expedition to Komodo and succeeded in capturing alive two of these giant lizards. These armor-plated, formidable-clawed, tapering-tailed creatures, measuring from eight to nine feet and weighing two hundred pounds, have been named *Varanus komodoensis*, were kept in a large wooden crate on deck during their voyage to America, and gave vent to their feelings by emitting tremendous hisses. They were fed two live chickens twice a day en route, but were so seasick they ate but little. One night two uneaten roosters annoyed the dragons by roosting on their snouts, and when the lizards blew them away the obliging roosters finished out the night on the lizards' tails.

Rubber and Florida

The possibility that the Para rubber tree (*Hevea brasiliensis*) may be successfully cultivated in southern Florida, has received encouragement by the discovery of a tree of this variety at Miami which has withstood at least twenty-five winters, although it has hitherto been supposed to thrive only within ten to fifteen degrees from the equator. The survival of this tree is thought to have been due to surrounding sheltering trees; however, it is possible that other rubber trees of this variety may be growing in southern Florida, and NATURE MAGAZINE asks that should such trees be found in existence, the fact be reported. The tree may be recognized by the leaves which have three pinnae on a long petiole, and by the seeds which are like large spotted castor beans, about an inch long. Anyone interested in further information with a view to experimental planting of the Para rubber tree, should communicate with the Department of Agriculture, which will be glad to cooperate, whenever possible.

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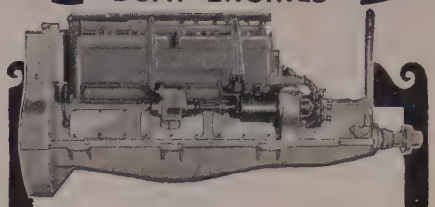

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Japanese Beetle

The Japanese Beetle has enlarged its sphere of activity to include portions of New York State and Connecticut, and the advisability of including these states in the existing quarantine, as well as extending the quarantine area in Pennsylvania, is being considered by the United States Department of Agriculture. Official action is probable at an early date, and it is suggested that people who would be affected by restrictions thus placed on interstate movement of produce, write to the U. S. Department of Agriculture, Washington, D. C., for full and complete details.

Another Use for Acorns

One of the ethnologists of the Smithsonian Institution, says Raymond J. Dobbs, in *Yosemite Nature Notes,* while carrying on investigations among the Southern California Indian tribes, learned from some of the oldest members of these tribes of a musical instrument made out of acorns. The acorns were strung on a cord and tuned according to size. The method of playing, he said, was to hold the end of the string in the hand, and as the acorns were in turn placed between the teeth and the string swung, the effect was said to compare with the music of the flute.

Wins Seed Honor

Samples of seed were sent out recently by the Official Seed Analysts throughout the United States and Canada, to be tested for purity and germination. Mrs. Mary C. Mowery, seed analyst of the Pennsylvania Department of Agriculture, was the only one participating who made a perfect score.

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Nature News Notes, a publication of the National Park Service. A pedestrian making a late trip to Storbo Mining Camp, between White River Public Camp and Glacier Basin, was startled by a crash in the underbrush, and two bright balls of fire, the balls "too far apart to make breathing at all feasible," confronted him just ahead. Fearing to turn and flee, the frightened man flourished his pocket torch and finally focused it upon those ominous balls of fire, which disappeared almost as abruptly as they had appeared. The next day the tracks of a large cougar were found near the spot.

That Woodchuck Again

That a woodchuck does climb trees seems to have been effectually established in the September NATURE MAGAZINE. A note along this line has aroused considerable interest among our members who assert, as eye witnesses, that the woodchuck not only climbs trees as a means of self-preservation, but to view the landscape, to enjoy the tender buds on the tips of the branches, and for various other reasons.

Mr. Elmer J. Landis, principal of the Monroe High School, at Macy, Indiana, states that the question would be answered in the affirmative if debated by the school boys of Indiana, without any hesitation. "They climb," says Mr. Landis, "not only to get a better view and satisfy themselves that no enemy is near, before venturing far from safety, for they realize their lack of speed. They climb in springtime for food when they may be seen rather expertly harvesting a very satisfactory meal of buds from the outer branches and tops of the smaller trees, sometimes twenty-five feet from the ground." So much for the middle west woodchuck.

Representing the New England woodchuck, Mr. Francis H. Williams of Springfield, Massachusetts, speaks with the authority of first-hand knowledge. "While tramping in Mt. Holyoke range with friend," he says, "we inadvertently got between a woodchuck and his hole. We knew of the existence of the hole, having examined it on previous occasions, but gave no thought to it at this particular time. Evidently the woodchuck did not like our appearance, for he hustled for two small cedar trees growing closely together at the base and without any apparent effort, though with entire leather case with coin pocket, richly embossed. Any name engraved in 18 kt. gold. Contains pencils and penholder in assorted colors, point protector, ruler, sharpener. Absolutely supreme in its class.

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No Work—Just Fun.
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SEE PAGE 260
For
Association Activities

eral occasions he has seen woodchucks chased up trees by dogs, but last June early in the morning he saw a woodchuck descending an elm tree whose lowest branches were about eighteen feet from the ground with no other trees or bushes near, and that the woodchuck was descending head first in the same manner as a red squirrel. He watched the woodchuck until it reached the ground and scampered away to his burrow. There were no dogs around and Mr. Pelton's conclusion was that if a dog had chased it up the tree, it must have occurred the previous evening or during the night, as he had been working close to the tree since daybreak.

Mr. Philip Ryder of the Oakwood School, Poughkeepsie, N. Y., has sent us two carefully prepared diagrams of woodchuck burrows which he and his cousin recently dug out. The more elaborate burrow took two hours to dig out, and shows Mr. Woodchuck as something of an architect in designing his home, with four entrances leading to two nests, conveniently arranged for entrance and exit.

Deeply Rooted Friends

By L. N. Merwin

This strangely mated pair is situated about three miles east of Utica, Nebraska. A small pine tree is growing from the base of a live cottonwood tree. The little pine had possibly heard the old adage about making two blades of grass grow where only one grew before, and presumed it ap-

plied to trees, so took up its abode with the grand old cottonwood. However, although the cottonwood is still alive, it only seems a matter of time until it will be strangled to death by the pine, and then there will only be one tree growing where two grew before.

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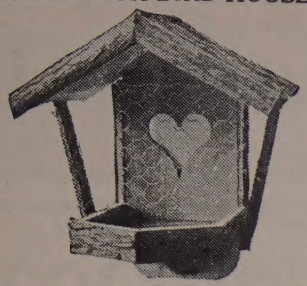

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3 Bird Houses for $5.00

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Feed the birds *NOW* and have them with you all winter.

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For smallest home or largest estate. Every home should have several.

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For window casings, porch columns, etc.

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Keeps food dry, avoids waste, holds a quart, weighs (packed) 3 pounds, and costs **$1** and postage. **Why pay more?**

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Balanced ration. It lures them, it holds them, it satisfies.

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PLYMOUTH ROCK SQUAB CO.

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Seeds Rain in Hawaii

The Department of Agriculture has shown by the aid of moving pictures, how acre after acre of insect-infested crops may be speedily and successfully treated by spraying from overhead by means of an airplane. Now, according to a War Department dispatch, the fire-devastated areas in Hawaii have recently been planted with tree seeds by army aviators. It is claimed that the work, which would have required ten years if undertaken by two men by the usual method, was accomplished by the planes in an hour and a half.

A Nature Puzzle

By Alvin L. Chittenden

The following Nature Puzzle conceals a slogan of two words. The answer will be published in the December issue of NATURE MAGAZINE.

My first is in barn owl, scorning the light.

My second in cardinal, brightest of bright.

My third in brown thrasher, but not in pewee.

My fourth is in nuthatch and scratch towhee.

My fifth in the farmer-boy's little mud hen.

My sixth is in vireo and also in wren.

My seventh in flicker who feeds in a tree.

My eighth is in oriole, a gay bird is he.

My ninth is in English sparrow so bold.

My tenth in wood thrush, his song's liquid gold.

My eleventh in bobolink a cheery bird ever.

My twelfth is in kingbird, he that's so clever.

My last is in grackle with voice sharp and hard.

My whole is a great help to birds in your yard.

Answer to the October Puzzle:

BIRD STUDY

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Please Mention NATURE MAGAZINE in answering advertisements. It will help us.

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Go to your dealer first—if he cannot supply you send in the coupon and we will ship prepaid.

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Please mail at once, postage prepaid:

☐ "falcon" set of 224 pcs. cabinet No. 9350 **$3.50**
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Ship Anywhere—Safe Arrival Guaranteed

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Imported Japanese and American Fish, Aquatic Plants, Castles, Globes, Food. We make artistic aquariums suitable for beautiful homes, conservatories, schools, etc. Illustrated circulars free.

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Attract Wild Ducks

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KEN-L-RATION solves forever your dog feeding problem. A *balanced* ration of *meat, cereals* and *cod liver oil.*

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10,000 Dogs Kept Healthy Last Year with

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More than 3,000,000 pounds of Miller's A-1 sold last year kept 10,000 dogs in healthy condition. Dogs like Miller's A-1. Its flavor is marvelous. Easily digested. Wholesome. Develops muscles. Builds bodies. Grows glossy coats.

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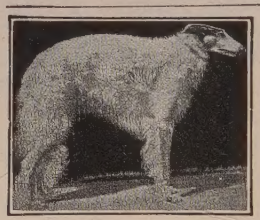

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The most beautiful specimens the dog world can offer. Home guards, loyal companions, useful and intelligent. Illustrated circulars free.

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Twenty-six Common Birds
(In Color)

Drawn by EDWARD KNOBEL
under the direction of RALPH HOFFMANN
The Birds pictured are as follows:

Red-winged Blackbird	Golden-crowned Kinglet
Bluebird	Robin
Bobolink	Chipping Sparrow
Catbird	Song Sparrow
Cedar Bird	Barn Swallow
Chickadee	Chimney Swift
Purple Finch	Scarlet Tanager
Flicker	Wood Thrush
Goldfinch	Red-eyed Vireo
Ruby-throated Humming-Bird	Black and White Warbler
Blue Jay	Yellow Warbler
Kingbird	Downy Woodpecker
Baltimore Oriole	House Wren

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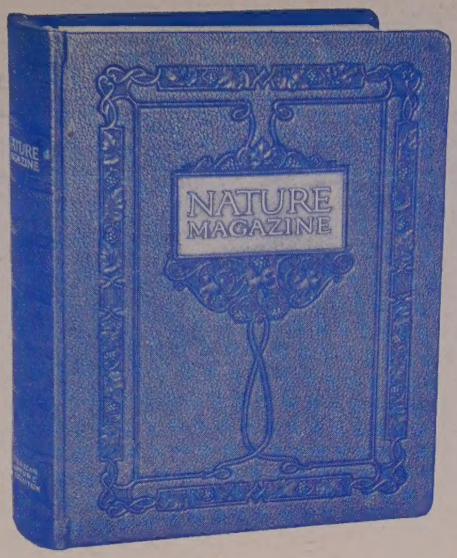

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